FINDING OF NO SIGNIFICANT IMPACT
FOR THE INSTALLATION AND OPERATION OF REMOTE VIDEO SURVEILLANCE SYSTEMS IN THE CENTRAL REGION OF THE IMMIGRATION AND NATURALIZATION SERVICE

PROJECT HISTORY: The former Immigration and Naturalization Service (INS) has the responsibility to regulate and control immigration into the United States. The INS has four major areas of responsibility: (1) facilitate entry of persons legally admissible to the United States, (2) grant benefits under the Immigration and Nationality Act (INA) of 1952 including assistance to persons seeking permanent resident status or naturalization, (3) prevent unlawful entry, employment or receipt of benefits, and (4) apprehend or remove aliens who enter or remain illegally in the United States. In regards to the latter responsibility, the U.S. Congress in 1924 created the U.S. Border Patrol (USBP) to be the law enforcement arm of the INS.

The INS has divided the U.S. into three separate Regions: Western, Central, and Eastern. This Programmatic Environmental Assessment (PEA) focuses on the Western Region. This Region is composed of seven USBP Sectors that are responsible for approximately 917-miles of the U.S./Canadian border and 1,367-miles of the U.S./Mexico border, most of which are remote and rugged terrain. Detecting and apprehending illegal activities over such a vast area is a daunting task. Undocumented Aliens (UDAs) and/or smugglers use many areas of the border, both urban and rural, to gain access to the U.S. Numerous tactics are employed to detect illegal entrants including remote sensing techniques that enhance the visual observations by USBP agents assigned to observation points. Conventional enforcement activities such as observation points and lighting are limited by the number of USBP agents and cannot operate on a 24-hour, 365-day basis. Therefore, the USBP has the need for a non-intrusive method for monitoring vast areas with limited resources (i.e., a force multiplier). Remote Video Surveillance (RVS) systems are a passive surveillance system that provides a partial solution to this problem while simultaneously limiting the potential impact to environmental resources.

This PEA addresses an abbreviated process of evaluating and assessing the actual and potential effects, beneficial or adverse, of the installation and operation of RVS systems (ongoing and proposed) by INS/USBP within the USBP Sectors of INS's Central Region. The installation of additional RVS systems is being proposed by INS in an effort to enhance the USBP's capability to gain, maintain and extend control of the U.S./Canadian and U.S./Mexico borders. This document describes the broad impacts of these actions; however, site-specific surveys and evaluations and tiered National Environmental Policy Act (NEPA) documents will be completed once locations for RVS system installations are identified if determined to be necessary by the Regional Environmental Officer. The results of the site-specific surveys, evaluations, and tiered NEPA documents will discuss cultural resources, biological resources, and other issues in greater detail than this PEA. This PEA will describe the cumulative effect of the proposed action in conjunction with other on- going and proposed projects.

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PURPOSE AND NEED: The primary purpose of the proposed action is to provide for the evaluation and assessment of the installation and operation of RVS systems in the INS Central Region. The objective is to enhance the USBP's ability to detect illegal activity along the U.S. borders by providing them with an all-weather, 24-hour surveillance system.

The operational effectiveness of the USBP will be greatly enhanced by increasing their surveillance capability once RVS systems are installed. RVS systems would allow the USBP to more effectively control a larger area (a force multiplier), improve response time, enhance the safety of USBP agents, and reduce the risks faced by UDAs attempting to illegally enter the U.S. RVS systems will also provide for a more compact enforcement area to patrol, allowing for a greater agent presence (i.e., deterrence) in high traffic areas. With the installation of the RVS systems, it is also believed that the risk and danger to human lives and number of attempted illegal entries would be sharply reduced through the deterrent effect such technology and enforcement flexibility would have.

The need for the proposed RVS systems is based upon increased border activity and the limited workforce available to the USBP. The U.S. experiences a substantial influx of UDAs and drugs each year. These illegal activities cost the American citizens billions of dollars annually due directly to criminal activities, as well as the cost of apprehension, detention and incarceration of criminals; and, indirectly in loss of property, illegal participation in government programs and increased insurance costs.

Since the September 11, 2001 terrorist attack on the United States, the INS and USBP have been identified as playing a key role in combating the threat of terrorism. This increased role requires more vigilance at the Ports-Of-Entry (POE) and along the entire length of the U.S. borders. The ability of the USBP to insure the integrity and security of our borders will be an essential part of the effort to fight and ultimately prevent terrorism. The forward deployment of technology in RVS systems will enhance the USBP's capabilities in the campaign to stop terrorist acts that threaten the country's national security.

The constant flow of UDAs passing through the border areas also threatens public lands, historical structures, and endangered species. Dealing with the detrimental effects of UDAs is becoming an ever-increasing burden on Federal and state land managers, private landowners, as well as the USBP. UDAs have trampled vegetation including protected species and their habitat, left litter, and abandoned vehicles throughout the entire border region.

Furthermore, many UDAs attempt to enter the U.S. through harsh environments and dangerous conditions. Many areas of the border are vast, undeveloped areas, which represent a danger to the UDAs from their exposure to the elements.

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Detection of UDAs, before they gain access to these harsh environments will reduce the number of injuries and help to prevent loss of life.

PROPOSED ACTION: The proposed action consists of the expanded use of RVS systems in the Central Region of INS by the USBP. At the present time, the proposed action includes the installation of up to 1,556 additional RVS systems in the Central Region over the next 10 years. This number is a planning level analysis. The actual number of RVS systems required will vary depending upon enforcement strategies and their function will continually be evaluated on a site-specific basis. The process and guidelines by which the proposed RVS systems would be installed is identified in this document. In addition, the Proposed Action would include the operation and maintenance of all existing and proposed RVS systems. Impacts from electrical supply (i.e., overhead utility lines, underground utility lines), lighting or sounds systems, access roads, and relay towers are not addressed in this PEA. The impacts of these actions would require separate NEPA compliance.

This PEA provides a project environmental review checklist by which the appropriate Regional Environmental Officer can review the project. Upon approval, a Finding of No Significant Impact can be forwarded to Headquarters INS for staffing and approval. This PEA also provides a process by which an abbreviated EA can be prepared to cover the installation of RVS systems that have, in the majority of cases, not demonstrated any need for further environmental impact analysis. This PEA also provides for the management of environmental issues whenever they are encountered.

ALTERNATIVES: Alternatives carried forward for analysis in the PEA include the No Action and the Proposed Action described above. The No Action would not satisfy the need for all weather, 24-hour surveillance systems. Under the No Action Alternative, the USBP would continue its current enforcement operations with limited use of available technology. Illegal entrants would be less likely to be detected and apprehended. USBP agents and illegal entrants would continue to be exposed to potentially dangerous situations. The number of USBP agents and adverse weather conditions under the No Action Alternative would limit continuous surveillance of the border. The No Action Alternative would allow the continued degradation of the border environment that results from illegal foot and vehicle traffic. Without the proposed action, increases in this traffic would result in additional impacts to the physical, biological, and socioeconomic resources along the borders.

The proposed action would significantly reduce the illegal vehicle and foot traffic along the borders thereby protecting physical and biological resources as well as having indirect benefits to socioeconomic resources through a reduction in crime and associated social costs. The forward deployment of RVS systems would aid the USBP in apprehending UDAs and drug smugglers while providing deterrence to these illegal activities. The proposed action would enhance the capability of the USBP to detect illegal activities at the border regions.

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resulting in a reduced enforcement footprint. Other alternatives considered but eliminated from further evaluation included an increased workforce alternative and an increased aerial reconnaissance/operations alternative.

ENVIRONMENTAL CONSEQUENCES: The proposed action would significantly reduce the illegal vehicle and foot traffic along the borders thereby protecting physical and biological resources as well as having indirect benefits to socioeconomic resources through a reduction in crime and associated social costs. The forward deployment of RVS systems would aid the USBP in apprehending UDAs and drug smugglers while providing deterrence to these illegal activities. The proposed action would enhance the capability of the USBP to detect illegal activities resulting in a reduced enforcement footprint. The effects of the proposed action include the loss of up to 89.3 acres of soils, vegetation, and wildlife habitat and their potential impacts to other resources. It is envisioned that many of the proposed RVS systems would be installed in previously disturbed areas, greatly reducing these impacts.

ENVIRONMENTAL DESIGN MEASURES: Environmental design measures for the proposed action will be managed by the USBP Sector Chiefs and will be provided by their RVS contractor in the design and build phases. These design measures include:

1. Potential sites for installation of RVS systems will be chosen using those site selection criteria set forth in this document to minimize or avoid impacts to biological and cultural resources.

2. The project environmental review checklist, as outlined in this document, would be completed to identify all potential impacts to resources from proposed RVS installations.

3. Consultation with the Natural Resource Conservation Service (NRCS) including the preparation of a farmland conversion impact rating forms, when necessary, would be completed to assess potential impacts to soils.

4. Best Management Practices employed by INS/USBP contractors would reduce the impacts of non-point source pollution during construction activities.

5. If jurisdictional wetlands are located within the region of impact and are unavoidable, early coordination with the applicable U.S. Army Corps of Engineers district, Environmental Protection Agency, the county NRCS, and other appropriate agencies

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would be completed prior to the initiation of the construction activities. Applicable Section 404 permit procedures would be completed prior to any work in these areas. When identified, wetlands would be flagged, and silt fences and hay bales placed around the wetland to eliminate or substantially reduce any unnecessary impacts to the wetland areas.

6. The proposed RVS systems would also comply with the Migratory Bird Treaty Act and U.S. Fish and Wildlife Service guidelines for reducing fatal bird strikes on communication towers.

7. Prior to any ground disturbing activity, consultation will be initiated with the State Historic Preservation Officers (SHPO) and/or Tribal Historic Preservation Officers (THPO). Site records checks and archaeological surveys will be conducted at each site in order to determine if there are any cultural resources that will be impacted during construction. If significant cultural resources are discovered within the area to be impacted, the appropriate mitigation measures would be implemented to minimize the impacts to those resources. These mitigation measures would be developed in consultation with the appropriate SHPO and/or THPO along with other interested parties. The preferred mitigation measure would be avoidance if possible.

   In areas where the RVS equipment would be mounted on buildings, the building to be impacted would need to be evaluated for historic significance if it is 50 years old or older or a Cold War Era building. If the building is found to be historically, or architecturally significant and eligible for listing in the NRHP then appropriate mitigation measures would be developed in consultation with the appropriate SHPO and/or THPO along with other interested parties. The preferred mitigation measure would be avoidance if possible.

   All sites would be assessed for visual impacts to any cultural resources within eyesight of the new construction and/or equipment. If there is a potential for significant visual impacts to cultural resources, particularly structures and/or historic districts, then a view shed analysis would be appropriate in order to determine the extent of the visual impacts if any,

   Through all levels of the Section 106 and National Environmental Policy Act (NEPA) process, consultation would be conducted with the appropriate Federally recognized tribes that claim a cultural affinity to the impacted area. These consultations could take the form of formal consultation letters, reviews of the NEPA documents, and reviews of the cultural resources survey reports for the appropriate projects.

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FINDING: Based upon the results of the PEA and the environmental design measures to be incorporated as part of the Proposed Action, it has been concluded that the Proposed Action would not have a significant adverse effect on the environment. Therefore, no further environmental impact analysis is warranted for the implementation of this abbreviated approach to providing Environmental Analyses of the RVS system.

James A. Caffrey, Acting Director
Headquarters, Facilities and Engineering Division

3/19/03
Date

DRAFT

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR THE INSTALLATION AND OPERATION OF REMOTE VIDEO SURVEILLANCE SYSTEMS IN THE CENTRAL REGION OF THE IMMIGRATION AND NATURALIZATION SERVICE

June 2002

Lead Agency:
Immigration and Naturalization Service
Headquarters Facilities and Engineering
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EXECUTIVE SUMMARY

PROPOSED ACTION:

The proposed action consists of the expanded use of Remote Video Surveillance (RVS) systems in the Central Region of the Immigration and Naturalization Service (INS) by the U.S. Border Patrol (USBP).

This Programmatic Environmental Assessment (PEA) analyzes the potential for significant adverse or beneficial impacts of the proposed action.

At the present time, the proposed action includes the installation of up to 1,556 additional RVS systems in the Central Region over the next 10 years. This number is a planning level analysis. The actual number of RVS systems required will vary depending upon enforcement strategies and their function will continually be evaluated on a site-specific basis. The process and guidelines by which the proposed RVS systems would be installed will be identified in this document. In addition, the Proposed Action would include the completion of RVS systems currently in the process of being installed and the operation and maintenance of all existing and proposed RVS systems.

This document describes the impacts of the proposed action; however, site-specific surveys and evaluations and tiered NEPA documents will be completed once locations for RVS system installation are identified. The results of the site-specific surveys, evaluations, and tiered NEPA documents will discuss impacted resources and other issues in greater detail than this PEA. This PEA will describe the cumulative effects of the proposed action in conjunction with other on-going and proposed projects.

PURPOSE AND NEED FOR THE PROPOSED ACTION:

The purpose of the proposed action is to enhance the USBP's ability to detect illegal activity along the U.S. borders by providing them with an all-weather, 24-hour surveillance system. The proposed RVS systems would greatly enhance the operational effectiveness of the USBP by increasing their surveillance capability thereby allowing them to more effectively control a larger area. The proposed RVS systems would also assist the USBP in apprehending illegal entrants and ultimately provide a deterrence factor to illegal entries.

The USBP has a need for the proposed RVS systems in order to prevent terrorism and reduce the number of illegal immigrants and drug trafficking along the borders. The forward deployment of technology in RVS systems would enhance the USBP's capabilities in the campaign to stop terroristic acts that threaten the country's national security as the INS and USBP have been identified as a key line of defense in combating the threat of terrorism.

The need for the proposed RVS systems has been established based upon increased border activity, the limited manpower available to secure the borders, and the effectiveness of RVS systems in the detection process. The U.S. experiences a substantial influx of illegal immigrants and drugs each year. Both of these illegal activities cost the American citizens billions of dollars annually due directly to criminal activities, as well as the cost of apprehension, detention and incarceration of criminals; and, indirectly in loss of property, illegal participation in government programs and increased insurance costs. The USBP also has a need to improve response time and secure the safety of UDAs attempting to illegally enter the U.S. and the USBP agents who attempt to apprehend them.

PROPOSED ACTION AND ALTERNATIVES: The proposed action addresses the expanded use of RVS systems in the Central Region of INS. The National Environmental Policy Act (NEPA) also requires that the "No Action" Alternative be analyzed in all NEPA documents. Several alternatives were also considered but eliminated because they do not meet the purpose and need of the project.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION: No significant adverse effects to the natural or human environment are expected upon implementation of the proposed action. Significant adverse impacts will be addressed on a site-specific basis and be analyzed in subsequent NEPA documents tiered from this PEA.

CONCLUSIONS: Based upon the results of the PEA and given the identified environmental design measures, it has been concluded that the proposed action would not have a significant adverse impact on the environment.

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APPENDICES

List of Acronyms/Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Affect
AQB	Air Quality Bureau
ATMs	Automatic Teller Machines
BBNP	Big Bend National Park
BBRSP	Big Bend Ranch State Park
BLM	Bureau of Land Management
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CO	Carbon Monoxide
CFR	Code of Federal Regulations
CRP	Conservation Reserve Program
CWA	Clean Water Act
dB	decibel
DNL	Day-Night average sound Level
EA	Environmental Assessment
ECOMAP	Ecological Classification and Mapping Team
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESSC	Earth System Science Center
ESA	Endangered Species Act
FCC	Federal Communications Commission
FICON	Federal Interagency Committee On Noise
FPPA	Farmland Protection Policy Act
FY	Fiscal Year
ICAD	Intelligent Computer Aided Detection
IIRIRA	Illegal Immigration Reform and Immigrant Responsibility Act
INA	Immigration and Nationality Act
INS	Immigration and Naturalization Service
ISIS	Integrated Surveillance Intelligence Systems
Leq	equivalent sound level
MDEQ	Montana Department of Environmental Quality
mg/m^3	milligrams per cubic meter of air
MOA	Memorandum of Agreement
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCA	Noise Control Act
NDDH	North Dakota Department of Health
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO	Nitrogen Dioxide
NOA	Notice of Availability
NMED	New Mexico Environmental Department
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NRCS	Natural Resource Conservation Service

List of Acronyms/Abbreviations (cont.'d)

NWP	Nationwide Permits
NWR	National Wildlife Refuges
O_3	Ozone
OHWM	Ordinary High Water Mark
P	Primary
Pb	Lead
PCPI	Per Capita Personal Income
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PM-2.5	suspended Particulate Matter less than 2.5 microns
PM-10	suspended Particulate Matter less than 10 microns
ppm	parts per million
ROI	Region Of Influence
RVS	Remote Video Surveillance
S	Secondary
SAR	Search And Rescue
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officers
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
THPO	Tribal Historic Preservation Officers
TNRCC	Texas Natural Resources Conservation Commission
TPI	Total Personal Income
TPWD	Texas Parks and Wildlife Department
UDAs	Undocumented Aliens
USACE	U.S. Army Corps of Engineers
USBP	U.S. Border Patrol
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDNR	Wisconsin's Department of Natural Resources
$\mu g/m^3$	micrograms per cubic meter of air

SECTION 1.0
INTRODUCTION

1.0 INTRODUCTION

The Immigration and Naturalization Service (INS) has the responsibility to regulate and control immigration into the United States. The INS has four major areas of responsibility: (1) facilitate entry of persons legally admissible to the United States, (2) grant benefits under the Immigration and Nationality Act (INA) of 1952 including assistance to persons seeking permanent resident status or naturalization, (3) prevent unlawful entry, employment or receipt of benefits, and (4) apprehend or remove aliens who enter or remain illegally in the United States. In regards to the latter responsibility, the U.S. Congress in 1924 created the U.S. Border Patrol (USBP) to be the law enforcement arm of the INS. The USBP has since become the leading Federal enforcement agency in the apprehensions of Undocumented Aliens (UDAs) and smugglers.

INS has divided the U.S. into three separate regions: Western Region, Central Region, and Eastern Region (Figure 1-1). The subject of this Programmatic Environmental Assessment (PEA) will focus on the Central Region of INS. The Central Region of INS is composed of seven USBP Sectors which are responsible for approximately 917 miles of the U.S./Canadian border and 1,367 miles of the U.S./Mexico border, most of which are remote and rugged terrain (Figures 1-2). Detecting and apprehending illegal activities over such a vast area creates a somewhat daunting task. UDAs and/or smugglers use many areas of the border, both urban and rural, to gain access to the United States. Numerous tactics are employed to detect illegal entrants including remote sensing techniques as well as visual observations by USBP agents assigned to observation points. Conventional enforcement activities such as observation points and lighting are limited by manpower and cannot operate on a 24 hour a day, 365 day a year basis and effectively monitor the entire border region. Therefore, the USBP has the need for a non-intrusive method for monitoring vast areas with limited resources (i.e. a force multiplier). Remote Video Surveillance (RVS) systems provide a partial solution to this problem while simultaneously limiting the potential impact to environmental resources.

This PEA addresses the actual and potential effects, beneficial or adverse, of the installation and operation of RVS systems (ongoing and proposed) by INS/USBP within the USBP Sectors of INS' Central Region. The installation of additional RVS

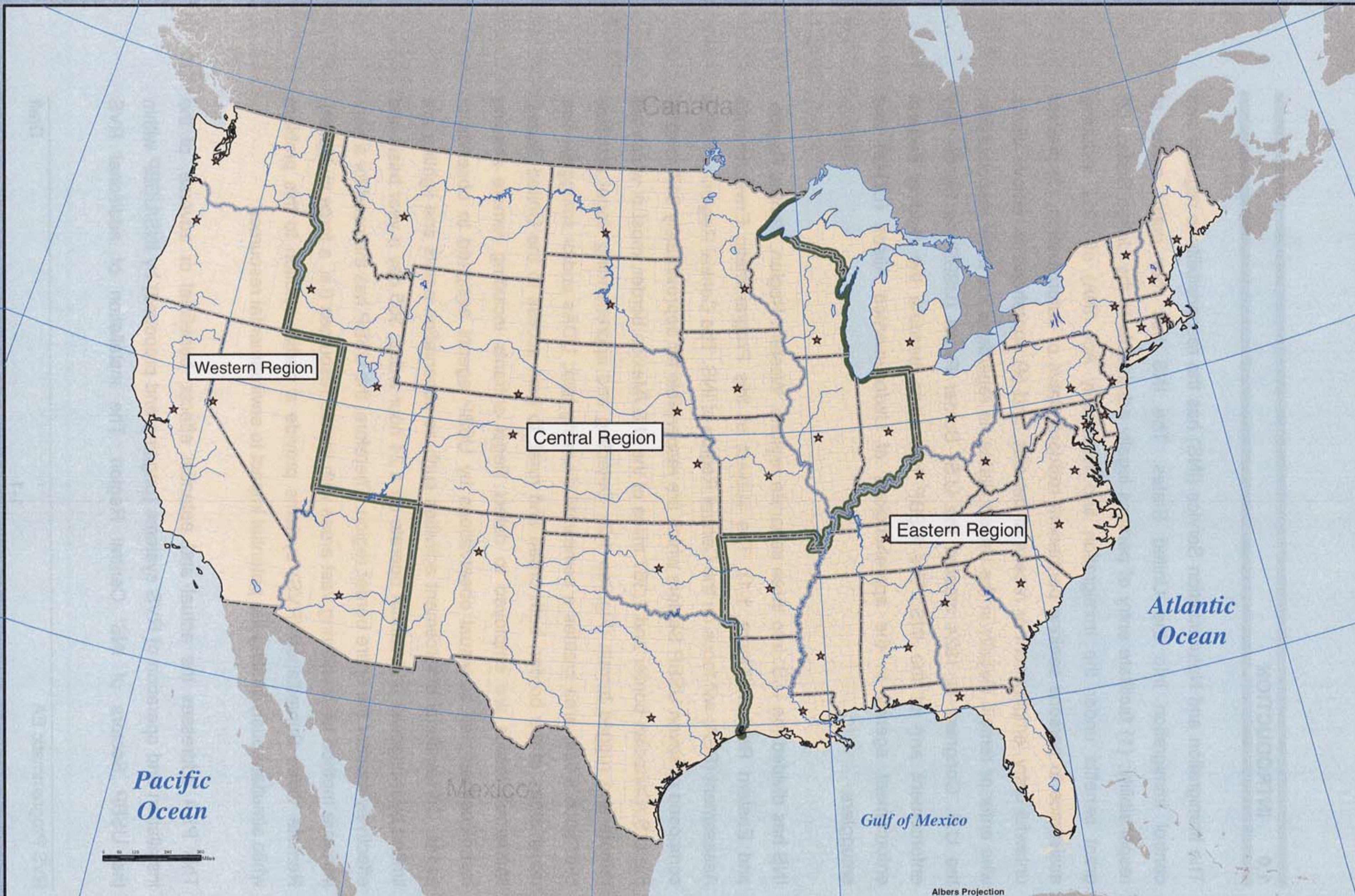


Figure 1-1 Immigration and Naturalization Service U.S. Border Patrol Regions

gsrc GULF SOUTH RESEARCH CORPORATION

Source: ESRI Data & Maps CD
Created in ArcGIS 8 using ArcMap

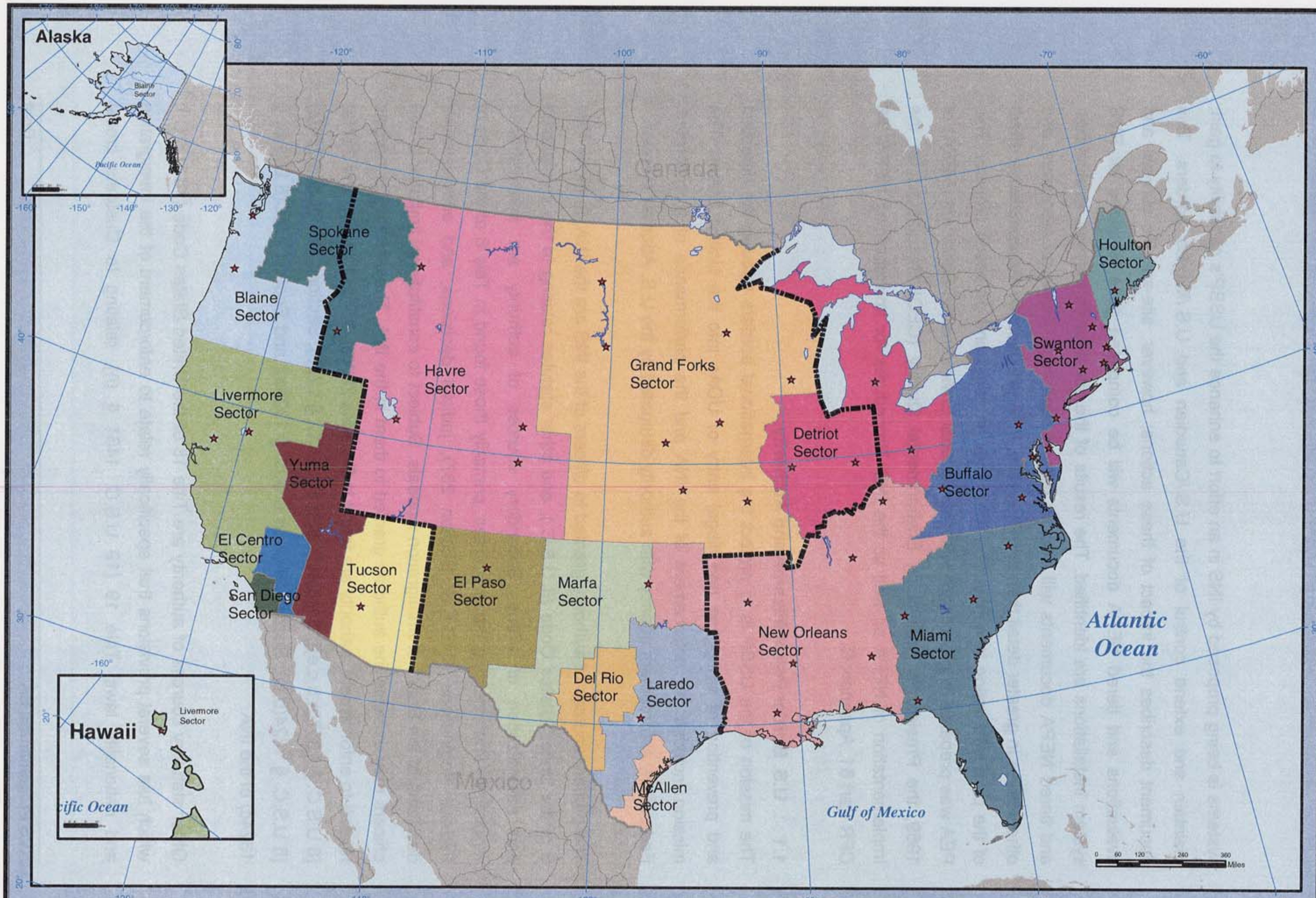


Figure 1-2 U.S. Border Patrol Sectors

GULF SOUTH RESEARCH CORPORATION

systems is being proposed by INS in an effort to enhance the USBP's capability to gain, maintain and extend control of the U.S./Canadian and U.S./Mexico borders. This document describes the impact of these actions; however, site-specific surveys and evaluations and tiered NEPA documents will be completed once locations for RVS system installations are identified. The results of the site-specific surveys, evaluations, and tiered NEPA documents will discuss cultural resources, biological resources, and other issues in greater detail than this PEA. This PEA will describe the cumulative effect of the proposed action in conjunction with other on going and proposed projects. This PEA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) Regulations for the Implementation of NEPA as well as the INS' Procedures for Implementing NEPA, 28 CFR Part 61, Appendix C.

1.1 U.S. Border Patrol Mission and Authority

The mission of the USBP is to protect the international borders through the detection and prevention of smuggling and illegal entry of UDAs into the United States. The mission includes the enforcement of the INA and the performance of a uniformed, Federal law enforcement agency with authority delegated by the U.S. Attorney General.

The primary sources of authority granted to officers of the INS are the INA, found in Title 8 of the United States Code (8 U.S.C.), and other statutes relating to the immigration and naturalization of aliens. Secondary sources of authority are administrative regulations implementing those statutes, primarily those found in Title 8 of the Code of Federal Regulations (8 C.F.R. Section 287), judicial decisions, and administrative decisions of the Board of Immigration Appeals. Subject to constitutional limitations, INS officers may exercise the authority granted to them in the INA. The statutory provisions related to enforcement authority are found in Sections 287(a), 287(b), 287(c), and 287(e) [8 U.S.C. § 1357(a,b,c,e)]; Section 235(a) (8 U.S.C. § 1225); Sections 274(b) and 274(c) [8 U.S.C. § 1324(b,c)]; Section 274A (8 U.S.C. § 1324a); and Section 274C(8 U.S.C. § 1324c) of the INA.

Other statutory sources of authority are Title 18 of the United States Code (18 U.S.C.), which has several provisions that specifically relate to enforcement of the immigration and nationality laws; Title 19 [19 U.S.C. 1401 § (i)], relating to Customs cross-designation of INS officers; and Title 21(21 U.S.C. § 878), relating to Drug Enforcement Agency (DEA) cross-designation of INS officers.

1.2 History and Background

The United States Congress passed the Immigration Act of 1891, the Nation's first comprehensive immigration law, which created the Bureau of Immigration within the Treasury Department and placed the Commissioner of Immigration in the Port of New York in response to concerns of rising numbers of undocumented migrants. The Bureau of Immigration was transferred to the Department of Commerce in 1903. Subsequent legislation (i.e., Immigration Act of 1924) requiring more stringent requirements to enter the United States, along with World War I and the Great Depression, caused immigration rates to decline over the next few decades.

In the years preceding World War II, the numerical quota system continued under amendments to the Immigration Act of 1924. The Displaced Persons Act of 1948, the Immigration and Nationality Act of 1952, and the Refugee Relief Act of 1953 along with other acts resulted in minimal immigration following World War II.

The majority of immigrants to the United States up until the 1960s came from Europe, with smaller numbers coming from Asia and other countries in the Western Hemisphere. In the 1960s, the national origins principle of determining immigration quotas was discontinued. During the 1960s and 1970s, legislation allowed for the immigration of refugees fleeing from political upheavals in specific countries and fleeing due to fear of persecution because of race, religion, or political beliefs. It was also during this period that the INA was amended in October 1965, placing the first numerical ceiling on the total number of immigrants allowed to enter the United States, and abolished quotas by nationality. The new system provided an annual ceiling of 290,000 (later reduced to 270,000 in 1980 by Congress).

Since 1980, an average of 150,000 immigrants have been naturalized every year. At the same time, undocumented aliens have become a significant issue. National statistics show a dramatic rise in the number of apprehensions made throughout the southern border – from 979,101 in 1992 to over 1.6 million in 2000 (USBP 2000). INS estimated that in 2001, between 6.5 and 7.5 million illegal aliens were residing in the U.S. (INS 2001a). More recent studies have indicated that this figure is probably closer to 10 million. INS apprehension rates are currently averaging more than one million UDAs per year throughout the country. For the past several years, Mexicans have comprised the largest number of legal as well as illegal immigrants to the United States. Of the 1.5 million apprehensions in Fiscal Year (FY) 1998, 12,000 (1%) of these were apprehended near the northern border. Apprehension figures for the northern border are relatively small when compared to the southern border; however, migrants from well over 100 countries attempted to enter the U.S. from Canada in FY 1998.

USBP activities are administered under the Field Operations Division of the INS, which is one of three INS Executive Divisions. As mentioned previously, the USBP's primary function is to detect and prevent the unlawful entry of aliens and smuggling along the nation's land and water borders. With the increase in illegal drug trafficking, the USBP also has assumed the major Federal responsibility for illegal drug interdiction.

Until the early 1990s there was limited awareness of border issues and little national attention was given to illegal border activity. The events of the nineties (e.g., increased apprehensions, increased drug use, Asian and Caribbean boat lifts, etc.) elevated the nation's awareness concerning illegal immigration as narcotics smuggling generated substantial interest in policing the borders. Increased national concern has led to increases in funding and staffing and has enabled the USBP to develop effective enforcement strategies independent of conventional limitations.

The USBP detects, deters and apprehends as a means to control illegal entry across the borders. Detection of illegal traffickers is accomplished through a variety of simple and technological resources (e.g., observing physical signs of illegal entry, ground sensors, and RVS systems). Deterrence is affected through the actual presence (24 hours per day, seven days per week) of the USBP agents on the borders along with other physical (natural and man-made) barriers and the certainty that the illegal entrants will be detected and apprehended. Apprehensions can only be accomplished by USBP agents who have access to adequate infrastructure and resources. Equally, apprehensions are possible when the USBP is assisted by technology in detecting illegal activities and where adequate deterrence can be achieved.

In partial response to the continued problems of smuggling and UDAs, the U.S. Congress passed the Illegal Immigration Reform and Immigrant Responsibility Act

(IIRIRA) of 1996. Title 1, Subtitle A, Section 102 of IIRIRA states that the Attorney General, in consultation with the Commissioner of Immigration and Naturalization, shall take such actions as may be necessary to install additional physical barriers, roads and other infrastructure deemed necessary in the vicinity of the U.S. borders to deter illegal crossings in areas of high entry into the U.S.

1.3 Purpose and Need

The purpose of the proposed RVS systems is to enhance the USBP's ability to detect illegal activity along the U.S. borders by providing them with 24-hour surveillance capabilities in compliance with IIRIRA. The RVS system is a passive all weather monitoring system which provides continuous electronic surveillance using day and night imagery. The operational effectiveness of the USBP will be greatly enhanced by increasing their surveillance capability once RVS systems are installed. RVS systems would allow the USBP to more effectively control a larger area (a force multiplier), improve response time, secure the safety of USBP agents, and reduce the risks faced by UDAs attempting to illegally enter the U.S. RVS systems will also provide for a more compact enforcement area to patrol, allowing for a greater agent presence (i.e. deterrence). With the installation of the RVS systems, it is believed that the risk and danger to human lives and number of attempted illegal entries would be sharply reduced through the deterrent effect such technology would have

The need for the proposed RVS systems is based upon increased border activity and the limited manpower available to the USBP. The U.S. experiences a substantial influx of UDAs and drugs each year. These illegal activities cost the American citizens billions of dollars annually due directly to criminal activities, as well as the cost of apprehension, detention and incarceration of criminals; and, indirectly in loss of property, illegal participation in government programs and increased insurance costs.

The proposed RVS systems would provide a force multiplier to the USBP enforcement strategy. The USBP is constantly shifting personnel and resources between areas experiencing a high intensity of illegal traffic. For example, in the mid 1990's agents were sent to San Diego to assist in Operation Gatekeeper and currently agents are being reassigned to the Tucson Sector because of increases in illegal traffic in this area.

More recently, a number of agents have been reassigned from other sectors to the northern border in response to the September 11th terrorist attacks. Since the September 11, 2001 terrorist attack on the United States, the INS and USBP have been identified as playing a key role in combating the threat of terrorism. This increased role requires more vigilance at the Ports-Of-Entry (POEs) and along the entire length of the U.S. borders. The ability of the USBP to insure the integrity and security of our borders will be an essential part of the effort to fight and ultimately prevent terrorism. The forward deployment of technology in RVS systems will enhance the USBP's capabilities in the campaign to stop terroristic acts that threaten the country's national security.

In mid-October 2001, some 110 USBP agents were moved from the southern border to the northern border. The installation of RVS systems can reduce the number of agents on temporary duty status and return them to perform other duties that are currently being neglected. In addition, those sectors that are currently lacking adequate personnel would benefit directly by the addition of RVS systems. The addition of RVS systems to these sectors along with increases in personnel and other resources would increase the effectiveness of enforcement efforts.

In FY 2001, the USBP apprehended 1.3 million UDAs and seized more than 1.2 million pounds of marijuana and over 17,300 pounds of cocaine (USBP 2002). The combined street value of these drugs was over $1.2 billion. USBP stations along the U.S.-Mexico border experienced a 19% increase in the number of drug seizures from FY 1998 to FY 1999, and an overall 30% increase since FY 1995. More importantly, the value and number of drug seizures along the borders represent at least 95% of those made by the USBP throughout the nation. Still, the United States is also experiencing epidemic levels of drug use and drug-related crimes as reported by the Office of National Drug Control Policy (1998 and 1999):

- Illegal drugs cost our society approximately $110 billion annually
- 1.5 million Americans were arrested in 1997 for violating drug laws
- 819 persons per 100,000 population were murdered during drug related offenses
- 322,000 Americans are casual heroin users and over 800,000 are heavy users
- 1.5 to 3 million Americans are casual cocaine users
- Prison populations (drug-related crimes) doubled between 1989 and 1996
- Over 10 % of Americans used some form of illicit drug in 1998

To combat these rising numbers, the Clinton Administration committed additional resources to law enforcement agencies, including the USBP. These increases were concentrated primarily along the southern border. As a result of increase enforcement efforts and additional resources along the southern border, illegal traffic has increasingly turned to the northern border as a means of illegally entering the United States. For example, the Grand Forks Sector has shown a 112 percent increase in the number of apprehensions between FY 2002 and FY 2001 while over the same time period the Havre Sector showed a 36 percent increase (INS 2001b).

The constant flow of UDAs passing through the border areas also threatens public lands, historical structures, and endangered species. Vehicles used by smugglers are continuously being abandoned in National Parks and other natural and sensitive areas. Dealing with the detrimental effects of UDAs is becoming an ever-increasing burden on Federal and State land managers, private landowners, as well as the USBP. UDAs have trampled vegetation and left litter, abandoned vehicles throughout the entire border region.

Furthermore, many UDAs attempt to enter the U.S. through harsh environments and dangerous conditions. Many areas of the border are vast, undeveloped areas, which represent a danger to the UDAs from exposure to extremely high temperatures in the summer and below freezing temperatures in the winter. USBP agents have been increasingly responsible for rescuing UDAs attempting to illegally enter the U.S. who have been subjected to heatstroke, snake bites, dehydration, hypothermia, or have simply become lost. Much of the international border is defined by rivers and other water bodies which appear to be passable, but UDAs may become swept away in the current or even drown while trying to cross these waters. Detection of UDAs before they gain access to these harsh environments will reduce the number of injuries and help to prevent loss of life.

1.4 Scope of Analysis

RVS systems have become an integral part of the detection process and greatly enhanced the USBP's ability to apprehend illegal entrants. RVS systems can be used separately or in combination with several types of systems or with other, more routine, enforcement actions (i.e., patrols). However, to be most effective, or for maximum optimization, RVS systems need to be utilized in conjunction with other infrastructure and resources. The installation of RVS systems has enhanced border enforcement efforts by optimizing the USBP ability to detect activity along the borders, determine when enforcement efforts are necessary to prevent illegal activities, and assisted in the apprehension process by identifying potentially dangerous settings for USBP agents.

RVS systems are one component of INS' Integrated Surveillance Intelligence Systems (ISIS) Program. The ISIS program recently has become an integral part of the detection process, thereby enhancing USBP agents' ability to detect and apprehend illegal entrants. RVS systems have become a powerful tool in the detection and apprehension of UDAs and illegal drug traffickers. There are no impacts from the use of ISIS components except for the installation of RVS systems and associated equipment. Consequently, INS and USBP elected to prepare this PEA to determine the potential impacts of RVS systems.

The PEA study area is defined by the seven USBP Sectors in the Central Region of INS and is further restricted to those counties within the sector which share an international border. The study area will hereafter be referred to as the Region of Influence (ROI) and is defined by the area potentially affected by the alternatives described later in this document. Since the INS defines its operational areas of control by region, the ROI was limited to the Central Region of INS in order to discuss impacts in greater detail. While the sectors extend well north and south of the border areas, over 99 percent of USBP operation/activities are located within 50 miles of the borders and RVS systems are normally installed in proximity to the borders. Therefore, the ROI is further limited to those counties along the U.S./Canadian and U.S./Mexico Borders which share an international border. Those counties that share an international border in the ROI will be listed under the USBP Sector descriptions in Section 1.5.

All available previous NEPA documents were reviewed during the development of this document to identify potential issues or comments received regarding RVS systems. Those documents which addressed RVS systems and guided the development of this document are included in the reference section. This PEA identifies all the RVS systems expected to be installed in the Central Region of INS over the next 10 years, in an attempt to avoid the misperception of piecemealing. In addition, the PEA defines the method by which future site-specific RVS systems will be analyzed.

1.5 Overview of the Central Region USBP Sectors

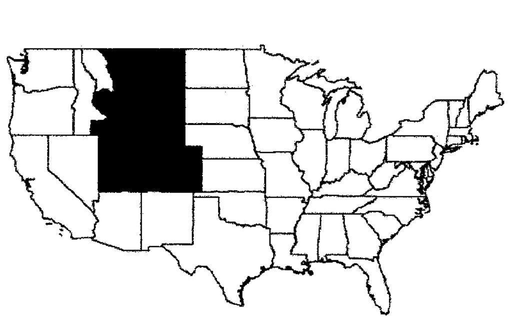
The Central Region of INS contains seven USBP Sectors that are responsible for illegal trans-boundary traffic along the U.S./Canadian and U.S./Mexico borders. Due to the differences between the Canadian and Mexican borders, they will be discussed separately. The following subsections present an overview of the U.S./Canadian and U.S./Mexico borders and the respective USBP Sectors, which control the borders.

1.5.1 U.S./Canadian Border – Central Region

The U.S./Canadian border is the 3,987-mile long international boundary between the United States and Canada. The States of Montana, North Dakota, Minnesota, and Wisconsin and the Canadian Provinces of Alberta, Saskatchewan, Manitoba, and Ontario define the northern border of the INS Central Region. The Central Region northern border comprises approximately 917 miles (23%) of the total northern border (excluding Alaska). Land use along the northern border is a mix of urban, agricultural, range, prairies, mountains, riverine, lake, and other land uses. The northern border is a land border in Montana, North Dakota and the western portion of Minnesota. Lake of the Woods, the Rainy River, and other smaller lakes define the border in eastern two-thirds of Minnesota. Lake Superior forms the international border along the State of Wisconsin.

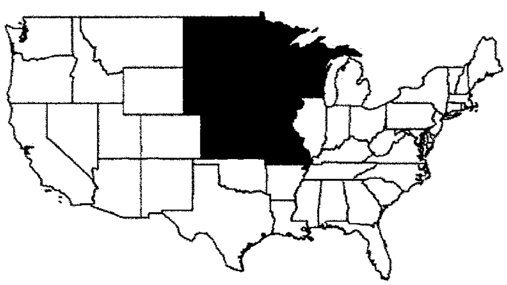
The USBP further defines the northern border into eight operational USBP Sectors: Blaine, Spokane, Havre, Grand Forks, Detroit, Buffalo, Swanton, and Holton Sectors all of which are responsible for controlling illegal trans-boundary activity within the regions area of operations. The two sectors which comprise the northern border in the Central Region of INS will be discussed in the following sections.

1.5.1.1 Havre Sector



The Havre Sector is responsible for the eastern three-fourths of the State of Montana, eastern Idaho, and the States of Utah, Wyoming, and Colorado. The Havre Sector is a unique sector in that much of the border is under the management of Federal and state resource agencies including the Department of Interior's Waterton-Glacier International Peace Park, The Blackfeet Indian Reservation, and lands managed by the Bureau of Land Management (BLM). USBP activities within the sector are responsible for patrolling diverse operational environments including agriculture, small urban areas, rolling grasslands, the Rocky Mountains, and arid plains. The Havre Sector includes 454 miles (11%) of the total northern border. The western edge of the sector is the Flathead/Glacier County line. The northern boundary of the sector follows the Montana State line. The eastern border of the sector is the Montana/North Dakota State line. The Havre Sector is composed of 47 Montana counties, eastern Idaho, and the States of Utah, Wyoming, and Colorado. There are currently nine USBP stations in the sector that are responsible for enforcement of the international border and 13 Ports Of Entry (POEs). Counties which share an international boundary are Glacier, Toole, Liberty, Hill, Blaine, Phillips, Valley, Daniels, and Sheridan County, Montana.

1.5.1.2 Grand Forks Sector



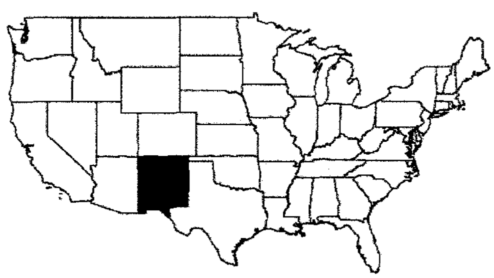
The Grand Forks Sector is responsible for the States of North Dakota, Minnesota, and Wisconsin. The Grand Forks Sector is the largest of all USBP sectors and is relatively undeveloped except for communities along the Great Lakes. USBP activities, within the sector, are responsible for patrolling diverse operational environments including agriculture, small urban areas, rangeland, and prairie. The Grand Forks Sector includes approximately 465 miles (12%) of the total northern border. The western edge of the sector is the Montana/North Dakota State line. The northern boundary of the sector follows the North Dakota, Minnesota, and Wisconsin State lines. Wisconsin shares an international boundary only through four counties along Lake Superior. The Grand Forks Sector is composed of the States of North Dakota, Minnesota, Wisconsin, South Dakota, Nebraska, Kansas, Iowa, Missouri, Illinois, and Indiana. Currently there are eight USBP stations in the sector which are responsible for enforcement of the international border and the 27 POEs. Counties which share an international border are Divide, Burke, Renville, Bottineau, Rolette, Towner, Cavalier, and Pembina Counties, North Dakota; Kittson, Roseau, Lake of the Woods, Koochiching, Carlton, St. Louis, Lake, and Cook Counties, Minnesota; and Douglas, Bayfield, Ashland, and Iron Counties, Wisconsin.

1.5.2 U.S./Mexico Border – Central Region

The southern border is the 1,908-mile long international border between the United States and Mexico. The U.S. States of New Mexico, and Texas and the Mexican States of Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas define the border in the Central Region. In the Central Region, the states of New Mexico and Texas comprise approximately 1,367 miles (72%) of the total southern border. Land use along the southern border is a mix of urban, agricultural, range, desert, mountains, riverine, lake, and other land uses. The southern border is a land border in New Mexico and the Rio Grande forms the international boundary along the entire Texas/Mexico border.

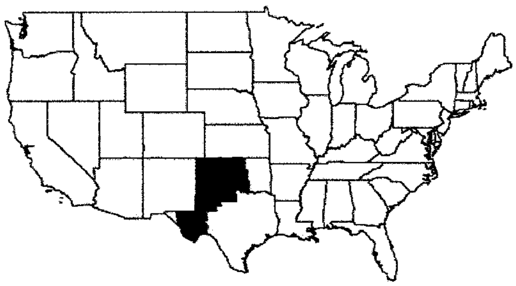
The USBP further defines the southern border into nine operational sectors, San Diego, El Centro, Yuma, Tucson, El Paso, Marfa, Del Rio, Laredo, and McAllen (See Figure 1-2). The five sectors that comprise the southern border in the Central Region will be discussed in the following subsections.

1.5.2.1 El Paso Sector



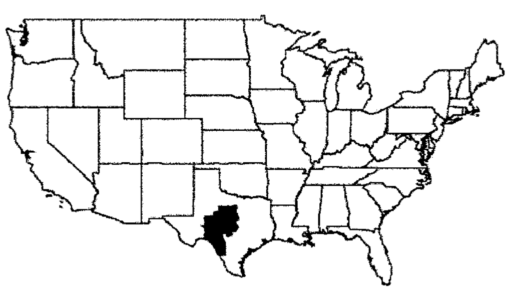
The El Paso Sector is responsible for the entire state of New Mexico and the extreme western portion of Texas. The El Paso Sector is one of two sectors across the southern border that has both a land and river border enforcement area as well as responsibilities in two states. USBP activities within the sector are responsible for patrolling diverse operational environments including agriculture, urban areas, riverine, mountains, and desert. The El Paso sector includes 290 miles (15%) of the total southern border. The western edge of the sector is the Arizona/New Mexico state line. The southern boundary of the sector in New Mexico is a land border. The southern boundary in Texas follows the Rio Grande from the City of El Paso to the intersection of Jeff Davis and Presidio counties. The El Paso Sector is composed of 33 New Mexico counties and two neighboring counties in western Texas (126,940 square miles). There are currently 11 USBP stations in the sector, six of which are responsible for enforcement of the international border. There are currently nine POEs in the sector. Counties which share an international border are Hidalgo, Luna, and Dona Ana Counties, New Mexico and El Paso and Hudspeth Counties, Texas.

1.5.2.2 Marfa Sector



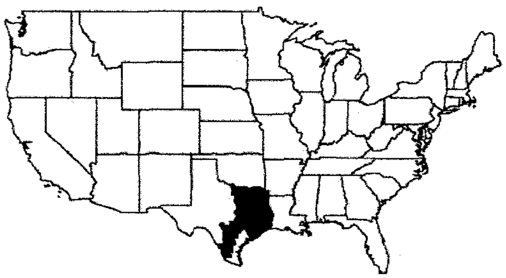
The Marfa Sector is the longest and most remote border sector along the southern border. Marfa is a unique sector in that much of the border is under the management of Federal and state resource agencies including the Department of the Interior's Big Bend National Park, Texas Parks and Wildlife's Black Gap Wildlife Management Area, and Big Bend Ranch State Park. USBP activities within the sector are responsible for patrolling diverse operational environments including agricultural and urban areas, rangelands, riverine, and mountainous environments. The Marfa Sector includes 420 miles (22%) of the total southern border. The western edge of the Marfa Sector is the intersection of Jeff Davis and Presidio Counties. The southern boundary follows the Rio Grande and includes all of Big Bend National Park. The eastern edge of the sector is the Terrell and Val Verde County line. The Marfa Sector is composed of 78 west Texas counties and 21 neighboring counties in western Oklahoma (135,529 square miles). There are presently 11 USBP stations in the sector, six of which are responsible for enforcement of the international border. Presidio, Texas is the only legal POE in the sector. Counties which share an international border in the Marfa Sector are Jeff Davis, Presidio, Brewester, and Terrell Counties, Texas.

1.5.2.3 Del Rio Sector



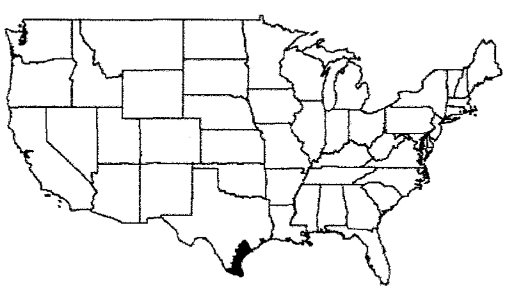
The Del Rio Sector is responsible for activity along the Rio Grande through a section of the border dominated by private ranches. USBP activities within the sector are responsible for patrolling diverse operational environments including agricultural and urban areas, rangeland, riverine, and lake environments. The Del Rio Sector includes 205 miles (11%) of the total southern border. The western edge of the Del Rio Sector is the Terrell/Val Verde County line. The southern boundary follows the Rio Grande and includes Amistad International Reservoir. The eastern boundary is the line dividing the Webb and Dimmitt Counties. The Del Rio Sector is composed of 41 Texas counties (48,000 square miles) that extend approximately 300 miles into the interior from the border. There are presently 10 USBP stations in the sector, of which five stations are responsible for enforcement of the international border. There are three legal POEs in the sector. Counties, which share an international border in the Del Rio Sector, are Val Verde, Kinney, and Maverick counties, Texas.

1.5.2.4 Laredo Sector



The Laredo Sector is responsible for activity along the Rio Grande through a section of the border dominated by private ranches and the International Falcon Reservoir. USBP activities within the sector are responsible for patrolling diverse operational environments including agricultural and urban areas, rangeland, and riverine environments and reservoirs. The Laredo Sector includes 172 miles (9%) of the total southern border. The western edge of the Laredo Sector is the line dividing Webb and Dimmitt Counties. The southern boundary of the sector follows the Rio Grande through Webb and Zapata Counties. The eastern boundary is the line that divides Starr and Zapata Counties. The Laredo Sector includes 116 Texas counties (101,439 square miles) and extends north to the Oklahoma border. Three of the eight USBP stations in the sector are responsible for enforcement of the international border. There are three legal POEs in the Laredo Sector. Counties which share an international border in the Laredo Sector are Webb and Zapata Counties.

1.5.2.5 McAllen Sector



The McAllen Sector is unique among USBP sectors due to the Gulf of Mexico, the Rio Grande Valley, and the large urban populations on both sides of the border. USBP activities within the sector include operations within coastal, riverine, tidal marsh, agriculture, wildlife refuges, urban areas, rangeland, and reservoirs. The McAllen Sector includes 281 miles (15%) of the total southern border. The western boundary is the Starr/Zapata County line and includes a portion of the International Falcon Reservoir. The McAllen Sector's boundary on the south is the Rio Grande and the Gulf of Mexico is the eastern boundary. The

McAllen Sector includes three Texas counties and extends up the Gulf Coast approximately 175 miles. Six of the nine USBP stations in the McAllen Sector are responsible for enforcement along the international boundary. There are 11 POEs in the McAllen Sector. Counties, which share an international border in the McAllen Sector are Starr, Hidalgo, and Cameron counties, Texas.

1.6 Report Organization

This PEA is organized into nine major sections including this section. Section 2.0 will describe the alternatives being considered. Section 3.0 will describe the affected environment of the Region of Influence (ROI). Section 4.0 will discuss the environmental consequences of implementing the viable alternatives. Section 5.0 will discuss the cumulative impacts and other proposed projects and Section 6.0 will discuss the proposed environmental design measures. Sections 7.0, 8.0, and 9.0 present public involvement, references cited in the document, and a list of the persons involved in the preparation of this document, respectively. Standard designs of RVS systems are discussed in Appendix A. Appendix B provides a list of the common and scientific name of plants and animals used in this document. Appendix C includes a list of all National Register of Historic Places (NRHP) listed properties in the counties comprising the ROI. Appendix D includes a farmland conversion impact rating form. Appendix E includes supporting documents of the public involvement program such as the notices of availability published in local newspapers, and a summary of the comments received during the public comment period.

SECTION 2.0
ALTERNATIVES

2.0 ALTERNATIVES

The alternatives considered in this PEA were based on the mission of the USBP to protect the international borders through the detection, apprehension, and deterrence of illegal entrant and smugglers into the Untied States. The primary focus of the proposed action is the detection of illegal activity along the border. The four alternatives considered during the preparation of this PEA include: (1) No Action, (2) Expanded use of RVS systems within the Central Region – the Proposed Action Alternative, (3) Increased Aerial Reconnaissance/Operations, and (4) Increased Manpower. With the exception of the No Action Alternative, the alternatives provide different means of increasing the USBP's capabilities of detecting illegal entry and smuggling along the borders.

Under the No Action Alternative, the USBP would continue its current management practices with limited use of available technology. Illegal entrants would be less likely to be detected and apprehended. USBP agents and illegal entrants would continue to be exposed to potentially dangerous situations. Continuous surveillance of the border would be limited by manpower and adverse weather conditions under the No Action Alternative. Efforts to protect biological and cultural resources would be considerable less effective or even futile without the detection and deterrence capabilities of the proposed RVS systems.

The type and magnitude of the impacts associated with each alternative would vary. Each alternative is discussed in more detail in the following subsections. A detailed description of the known and expected impacts associated with each of the alternatives is presented in Chapter 4 of this PEA.

2.1 Operational Criteria

Each alternative, as well as the no-action alternative, has been evaluated using the programmatic objective, with respect to associated environmental consequences. Programmatic operational criteria, in general, include important design, location, or construction features that may affect the degree to which the proposed action can satisfy the project needs and objectives. Operational criteria relevant to the needs and objectives of the proposed action, include:

- Provide continuous surveillance;
- Facilitate rapid response time to operational and emergency situations;
- Minimize exposure of USBP agents to the elements and unknown and potentially dangerous conditions;
- Maximize use of existing USBP agent manpower;
- Economic analysis;

Environmental factors in general are those conditions that must be met to minimize potential adverse impacts to the environment or socioeconomic resources. For the analysis of environmental criterion of the proposed action, this EA will evaluate the impact upon endangered species and land, air, water, cultural, and biological resources.

2.2 No Action Alternative

Under the No Action Alternative, the USBP would continue its current enforcement strategies with limited use of available technology. This alternative would not allow for the expansion of the USBP's RVS program and would eliminate all proposed RVS system installation. This alternative would, however, allow all ongoing RVS system installation to be completed and any normal maintenance and operation requirements associated with existing systems to continue. Even though this alternative would reduce unavoidable impacts and irretrievable losses of resources, it would greatly hinder the USBP's capability to detect illegal activity along the borders and their ability to fulfill their mission.

The No Action Alternative would not provide continuous surveillance of the borders and would not minimize the exposure of USBP agents and UDAs to potentially dangerous conditions. Additionally, the No Action Alternative limits the use of technology and does not enhance the USBP's detection process. The alternative to technological aids in the detection process involves the use of manpower at observation points to detect illegal activity along the border. Limiting the use of technology in the detection process (i.e. RVS systems) does not maximize the use of existing USBP agent manpower. This alternative does not facilitate rapid response time because USBP command centers would not have access to the real-time video provided by RVS systems and would therefore have a limited understanding of the current situation in the field. Without the aid of the real-time video provided by RVS systems, USBP command centers must rely on radio communications to dispatch, apprehend, or deter illegal activities.

Without the deployment of RVS systems, the USBP would continue to employ existing tactics for detecting illegal activities that rely upon and are limited by manpower. Illegal entries into the U.S. would continue at current levels or increase. UDAs and smugglers would circumvent areas where RVS systems are already in use and continue to degrade the border environments. As the number of illegal entrants continue or increase, the USBP agents would be forced to increase the intensity of their efforts and enlarge the area they require for apprehending them. As the entry attempts and enforcement activities increase, biological and cultural resources would continue to be adversely impacted throughout the border regions.

Many of the areas along the borders have been damaged by illegal activities as footpaths and trails have been trampled throughout sensitive areas along the borders. Many footpaths are so heavily used that the resulting soil erosion has changed the look of the border regions. Throughout the border region, trash left behind from UDAs has been littered along almost every arroyo, canyon, waterway, National Park, and wildlife management area along the southern border. The No Action Alternative will allow this pattern to continue and result in continued and increased degredation of the border regions without the deployment of RVS systems to aid the USBP in the detection and apprehension process.

2.3 Proposed Action

The Proposed Action involves the expanded use of RVS systems in the Central Region of INS. In addition, the Proposed Action would include the completion of RVS systems currently being installed and the operation and maintenance of existing and proposed RVS systems.

The expanded use of RVS systems would greatly enhance the USBP's ability to detect illegal activities along the border by providing 24-hour surveillance capabilities of remote and rugged locations along the border. RVS systems would provide a force multiplier that would allow fewer agents to be committed to detecting illegal activity and therefore create additional manpower that is available for apprehending UDAs and drug traffickers. It is believed that once RVS systems have been effectively deployed along the borders and apprehensions increase, RVS systems will serve as an overwhelming deterrence to illegal traffic and reduce the volume of UDAs and smugglers attempting to cross the borders. This alternative would also prevent UDA traffic from the dangerous conditions that face one trying to enter the country illegally and protect USBP agents from potentially dangerous situations. Even though this alternative would have unavoidable impacts and irretrievable losses of resources, it would greatly enhance the operational effectiveness and aid the USBP's mission to gain and maintain control the border. This alternative would also enhance the ability of the USBP to detect and apprehend illegal entrants in proximity of the border and therefore result in less trans-border traffic and fewer enforcement actions outside the immediate border vicinity. Thus indirectly protecting resources that would otherwise be lost to continual UDA traffic and drug smuggling.

This alternative would provide for the installation of the proposed RVS systems within the process and guidelines identified in this document. During the evaluation and approval process for each RVS system installation, separate clearance procedures required by the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA) will be undertaken, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the appropriate State Historic Preservation Office (SHPO), respectively. The site selection criteria and environmental compliance must be met before installation or operational activities begin. RVS system installation could proceed under the NEPA coverage provided in the PEA, after the environmental compliance process is completed.

2.3.1 RVS Installation Process

The following paragraphs will outline the RVS installation process that will be used to identify and evaluate site-specific locations. Only those locations where no significant environmental issues are discovered would be covered under this process. In locations where significant environmental issues are found, an Environmental Assessment or other NEPA documentation tiered from this PEA will be necessary. In locations where RVS systems will be mounted on existing structures a cultural resources evaluation will be necessary for existing structures.

2.3.1.1 RVS System Site Selection Criteria

Potential sites for installation of RVS systems will be chosen using site selection criteria. The locations of the potential RVS sites will be determined based upon the known presence of illegal entry and activities, amount of time normally required to respond to the area, and the juxtaposition with extant systems to ensure that optimum surveillance capabilities would be provided. Site-specific locations would be selected based upon proximity to existing roads and power sources, ability to obtain lease or right-of-entry, and topography. The following site selection criteria define the operational criteria through which specific locations for RVS installation will be identified.

1. Tactical Relevance -a location along the border from which satisfactory video coverage of the area to be monitored is possible. Tactical relevance also includes the sites relationship to known illegal entry routes and activities. Topography is the major factor in determining a site's tactical relevance.
2. Technical Capacity -the ability to transmit a signal to a relay station or the command center operating the RVS system. Local topography determines a sites technical capacity. RVS systems are generally operated as a system where signals are relayed between RVS sites and ultimately transmit the signal to a USBP command center.
3. Site Access –ingress and egress to the site should be evaluated for minimization of impacts.
4. Power Source Accessibility/Type
    a. Solar -is the preferred power source when overhead utilities are not available in proximity to the site. Solar powered systems may include propane generators or wind power as a backup power system: Solar powered systems are severely limited by geographic location and other engineering constraints.
    b. Above Ground/Overhead Utility Lines -are the preferred power source when local electrical grids are available in proximity to a given location.
    c. Trenching/Underground Utility Lines -can be used in limited applications where overhead utilities may cause visual impacts; however, environmental impacts are greater.
5. Site Selection
    a. Necessary Ground Disturbance -locations where the least amount of ground disturbance (i.e. associated roads, structures) are the preferred locations for RVS systems.
    b. Surrounding Land Use –surrounding land use should be evaluated in order to minimize impacts to existing land uses.
    c. Land Ownership –support and permission from landowners must be obtained if sites are located on private property.
    d. Property Acquisition Costs -some properties are less desirable due to their high cost or the unwillingness of property owners to sell the property.

In reviewing previous NEPA documents, several common environmental factors that became an important part of the decision-making process were identified. Common factors to be considered include, but are not limited to:

- Absence of Archaeological and Cultural Resources
- Absence of Threatened and Endangered Species
- Aesthetics/Visual Impact
- Proximity of construction to wetlands or water bodies
- Public Opinion

Once specific locations are identified using the above-mentioned site selection criteria, a project environmental review checklist will be completed for each site to identify potential impacts to resources in the area.

2.3.1.2 Project Environmental Review Checklist

The objective of the project environmental review checklist is to identify all potential impacts to resources from proposed RVS installations on a site-specific basis. The project environmental review checklist (Exhibit 1) is included at the end of Chapter 2. The project environmental review checklist would be completed for each site proposed for RVS system installation, after site-specific locations have been identified through the site selection criteria. An interdisciplinary team of environmental professionals would complete the project environmental review checklist with approval by the INS Central Region Office. In addition to the project environmental review checklist, agency coordination and surveys of the sites would be performed. Site surveys for impacts to resources would include, but are not limited to, threatened, endangered, or other sensitive species, unique and sensitive areas, vegetation, wetlands, archaeological and cultural resources, and hazardous materials. This information will be incorporated into an abbreviated Environmental Assessment (EA) that will be tiered from this document. The completed project environmental review checklist, the results of the site-specific surveys, and agency coordination letters will also be included as appendices to the abbreviated EA.

Further NEPA documentation (i.e., a Supplemental EA, EA, or Environmental Impact Statement) would be required to address any significant impacts discovered during the completion of the project environmental review checklist or during the site-specific surveys.

2.3.1.3 Abbreviated EA

The abbreviated EA would include the number of sites evaluated and their location, completed project environmental review checklist, agency coordination letters, and a summary of the findings of the site-specific surveys. Upon approval of the abbreviated EA, RVS system installation would begin for those locations covered under this process assuming no potential significant environmental issues are identified.

2.4 Alternatives Considered But Eliminated From Further Consideration

2.4.1 Increased Aerial Reconnaissance/Operations Alternative

Under this alternative, increased aerial reconnaissance would involve the use of helicopters and fixed-wing aircraft for surveillance of the border. INS uses fixed-wing aircraft and helicopters to perform reconnaissance and detection operations as well as to support ground patrols.

This alterative was eliminated from further consideration because it does not satisfy the purpose and need of the project. The purpose and need calls for a 24-hour, all weather system for detection of illegal activities. Aerial reconnaissance/operations require highly skilled pilots, cannot be used on a 24-hour per day basis, and cannot operate under all weather conditions. Aerial reconnaissance/operations also have limited detection capabilities in areas such as deep ravines, at nighttime, and in thick vegetation.

Aerial reconnaissance/operations are also limited over or near military installations, National Parks and wilderness areas, and near commercial airports. The Federal Aviation Administration and/or the Department of Defense impose flight restrictions on USBP operations on missions over or near their facilities. Aerial reconnaissance/operations have also restricted flight patterns near endangered species or other sensitive wildlife habitats, at nighttime, or over Indian reservations or other sacred cultural sites.

This alternative does not provide an adequate alternative to the entire Central Region of INS; however, aerial reconnaissance/operations have proven to be an effective border enforcement strategy is some areas of the border. For example, aerial operations have proven highly effective in areas of the desert southwest where the open terrain, low growing vegetation, and sandy soils allow UDAs and signs of other illegal border traffic to be easily recognized from aircraft. Additionally, aerial reconnaissance/operations have become invaluable to USBP agents and UDAs for performing Search and Rescue (SAR) missions and during vehicle pursuits. Due to their effectiveness in given situations and specific areas of the border, increasing aerial reconnaissance/operations may be an effective solution in given areas or to meet the purpose and need of other INS activities.

2.4.2 Increased Manpower Alternative

Another alternative that was considered during the preparation of this PEA was to increase the manpower and thereby increasing patrol efforts as an alternative to RVS systems. The sites that will be selected for RVS installation are considered high intensity areas for illegal entries; thus, an alternative to the RVS system would be to station additional USBP agents at each of these sites to observe activities and detect any potential illegal entry efforts. USBP agents would have to be stationed at these sites 24 hours per day, seven days a week, in order to provide the same level of detection capabilities as the RVS system. Such efforts would require an enormous commitment of resources and would demand an increase of about 9,336 agents (assuming it would require approximately six agents to monitor an area equal to that which one RVS system can monitor) to obtain an equal level of effectiveness as the proposed RVS systems. In addition, the purchase of large amounts of equipment would be necessary due to the fact that USBP agents and/or their vehicles would have to be equipped with infrared cameras or spotting scopes to allow night observations, or portable or permanent lights would need to be installed.

Furthermore, the USBP agents would not be able to observe the same reaches as the RVS systems from the same locations due to trees, buildings, and local topography. Consequently, additional observation points would have to be established to provide the same coverage as the proposed RVS systems which would disturb additional areas along the border.

This alternative was not considered viable due to the increased manpower needs and additional equipment required to meet the same level of detection. The additional staff would not provide additional flexibility in a USBP station's enforcement strategy. Furthermore, authorization from the U.S. Congress would be required to employ the number of additional agents needed to substitute the proposed RVS systems.

2.5 Summary

Four alternatives are evaluated in this PEA including: (1) No Action, (2) Expanded use of RVS systems within the Central Region – the Proposed Action Alternative, (3) Increased Aerial Reconnaissance/Operations, and (4) Increased Manpower. The Proposed Action and No Action alternatives will be carried forward for analysis. The Increased Aerial Reconnaissance/Operations and Increased Manpower Alternatives do not meet the purpose and need of this project and therefore will not be carried forward for analysis.

Table 2-1 presents a summary matrix of the selection criteria from each of the alternatives and how the alternatives satisfy these criteria. Table 2-1 demonstrates how the proposed action meets all of the operational criteria set forth as well as showing the shortcomings of the other alternatives evaluated in this PEA. The following paragraphs present a summary of each of the impacts and benefits of the alternatives:

- No Action Alternative

Under the No Action Alternative, the USBP would continue its current management practices with limited use of available technology. Illegal entrants would be less likely to be detected and apprehended. USBP agents and illegal entrants would continue to be exposed to potentially dangerous situations. Continuous surveillance of the border would be limited by manpower and adverse weather conditions under the No Action Alternative. Efforts to protect biological and cultural resources would be considerable less effective or even futile without the detection and deterrence capabilities of the proposed RVS systems. The No Action Alternative would allow the continued degradation of the border environment that results from illegal foot and vehicle traffic. Without the proposed action, increases in this traffic would result in additional impacts to the physical, biological, and socioeconomic resources along the borders.

- Proposed Action Alternative

The proposed action would significantly reduce the illegal vehicle and foot traffic along the borders thereby protecting physical and biological resources as well as having indirect benefits to socioeconomic resources through a reduction in crime and associated social costs. The forward deployment of RVS systems would aid the USBP in apprehending UDA's and drug smugglers while providing deterrence to these illegal activities. The proposed action would enhance the capability of the USBP to detect illegal activities resulting in a reduced enforcement footprint. The effects of the proposed action include the loss of up to 32.1 acres of soils, vegetation, and wildlife habitat and their potential impacts to other resources. It is envisioned that many of the proposed RVS systems would be installed in previously disturbed areas, greatly reducing these impacts.

Table 2-1. Summary and Comparison of Alternatives

CRITERIA	No Action	Proposed Action	Increased Aerial Reconnaissance	Increased Manpower
Provide 24-hour surveillance detection capabilities in compliance with IIRIRA	No	Yes	No	No
Minimize exposure of USBP agents to the elements and unknown and potentially dangerous conditions encountered during apprehensions	No	Yes	No	No
Facilitate rapid response time to operational and emergency situations	No	Yes	Yes	Yes
Maximize use of existing USBP agent manpower	No	Yes	No	No
Cost effective means of increasing the USBP's ability to detect UDAs and drug smugglers attempting to illegally enter the U.S.	No	Yes	No	No

Exhibit 1
Project Environmental Review Checklist

Project Environmental Review Checklist

PROJECT INFORMATION

Project Name:

Site Name:

1. Station:
2. Point-of-Contact:

Project Location:

a: General Location

b: Latitude/Longitude/Elevation:

c: Township, Range, and Section

d: RVS design (pole, tower, mounted on existing structure)

Name, address, and telephone number of landowner:

Name, title, address, and telephone number of party preparing Project Environmental Review Checklist:

NAME

TITLE

ADDRESS

TELEPHONE NUMBER

SIGNATURE

NOTE This checklist is designed as a guidance document for identification of resource impacts to be used by:

1) INS/USBP agents during the preliminary site selection process. The completed checklist is to be provided to the environmental contactor as evidence of the site selection process and to identify potential impacts requiring further investigation. This document is not intended to replace the National Environmental Policy Act (NEPA) process or replace NEPA documentation of impacted resources; however, it is intended to be a tool to be used during the NEPA process; and
2) by the environmental contractor completing NEPA documentation of the project to ensure all potential resource impacts are identified and evaluated during the NEPA process.

ENVIRONMENTAL IMPACTS

Explanations for all responses are provided on attached sheets.

Issue Area	Potential Impact? Yes	Maybe	No
1. Geology, Soils and Topography. *Will the proposed RVS installation result in:*			
a. A need for a large tower to provide line-of-sight with another RVS, U.S. Border Patrol station, or RVS command center.	___	___	___
b. The destruction, covering, or modification of any unique geologic or physical features?	___	___	___
c. The loss of unique soils or a contribution to wind or water erosion?	___	___	___
2. Water Resources. *Will the proposed RVS installation result in*:			
d. Changes in currents, flow, or circulation, or the course of direction of water movements, in either marine or fresh waters?	___	___	___
e. Changes in absorption rates, drainage patterns, or rate and amount of surface runoff?	___	___	___
f. Alterations to the course of flow of floodwaters, sediment deposition, or erosion?	___	___	___
g. Discharge into surface waters or in any alteration of surface water quality or quantity?	___	___	___
h. Change in the quality or quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	___	___	___
i. Change in groundwater quality?	___	___	___
j. Disturbance in or in close proximity to wetlands (marshes, bogs, swamps, etc.) or other water bodies (rivers, streams)?	___	___	___
3. Air Quality. *Will the proposed RVS installation result in*:			
k. Air emissions or deterioration of ambient air quality during construction activities?	___	___	___
l. The creation of objectionable air quality during construction activities?	___	___	___
4. Botanical Resources. ***Informal consultation with the appropriate U.S. Fish and Wildlife Service Office and state wildlife agency must be submitted and will aid in the answers to the following questions. *Will the proposed RVS installation result in*:			
m. Destruction of threatened, endangered, or other sensitive plant species, or communities?	___	___	___
n. Reduction of the numbers or habitat of any rare, endangered, or otherwise sensitive species of plants?	___	___	___
o. Disturbance of any sensitive plant community or valuable tree specimens?	___	___	___

Issue Area	Potential Impact? Yes	Maybe	No
p. Introduction of new species of plants into an area, or an impediment to the normal reproduction and growth of existing species?	___	___	___
q. Disturbance, destruction, loss or occur in close proximity to Federally designated critical habitat?	___	___	___

5. Fish and Wildlife. ***Informal consultation with the appropriate U.S. Fish and Wildlife Service Office and state wildlife agency must be completed and will aid in the answers to the following questions.

Will the proposed RVS installation result in:

	Yes	Maybe	No
a. Alteration or loss of fish, wildlife, or other aquatic habitat?	___	___	___
b. Change in the diversity of species, or numbers of any species of animals (mammals, birds, amphibians, reptiles, fish, or insects)?	___	___	___
c. Reduction in the numbers or habitat of any endangered or otherwise sensitive species?	___	___	___
d. Introduction of a barrier to the migration or movement of species (wildlife corridor, fragment habitat)?	___	___	___
e. Disturbance of communal wildlife nesting areas? (rookery)	___	___	___

6. Agriculture. *Will the proposed RVS installation result in*:

	Yes	Maybe	No
f. Reduction in acreage or production of any agricultural crop?	___	___	___
g. Reduction of agricultural activities, including cropping and grazing?	___	___	___
h. Loss of unique agricultural lands (e.g. prime farmland, Williamson Act lands)?	___	___	___

7. Natural Resources. *Will the proposed RVS installation result in*:

	Yes	Maybe	No
i. Visual/aesthetic impacts to wildlife viewing areas, wildlife management areas, national, state, or local parks, wildlife refuges, or other important wildlife areas?	___	___	___

8. Cultural Resources. ***Informal consultation with the State Historic Preservation Office and Federally Recognized Tribes must be submitted and will aid in the answers to the following questions.

Will the proposed RVS installation result in:

	Yes	Maybe	No
j. Alteration, destruction, or construction within proximity of a prehistoric or historic archaeological resources/sites?	___	___	___
k. Adverse physical or aesthetic effects to a prehistoric or historical building, structure, or object?	___	___	___
l. A physical change, which would affect unique ethnic cultural values?	___	___	___
m. Visual/aesthetic impacts to any historic structures, buildings, national landmarks, historic districts, historical properties, or sacred/ religious Native American sites?	___	___	___

Issue Area	Potential Impact? Yes	Maybe	No
n. Modification or construction near a structure listed on the National Register of Historic Places, any structure greater than 50 yrs. old, or a cold war era building?	___	___	___
o. Within proximity of lands used for religious or sacred uses?	___	___	___
9. Land Use and General Plan Consistency. *Will the proposed RVS installation result in*:			
p. Conflicts with existing or surrounding land uses (zoning)?	___	___	___
q. Conflicts with future planned land uses?	___	___	___
r. Inconsistency with other land use policies?	___	___	___
10. Recreation. *Will the proposed RVS installation result in:*			
s. Impact upon the quality or quantity of existing and future recreational opportunities?	___	___	___
11. Aesthetics. *Will the proposed RVS installation result in*:			
t. Obstruction of any scenic vista or view open to the public, or will the proposed RVS installation result in the creation of an aesthetically offensive site open to public view?	___	___	___
12. Utilities. *Will the proposed RVS installation result in*:			
u. A need for new access roads?	___	___	___
v. A need for new overhead or underground utilities?	___	___	___
13. Hazardous Materials. *Will the proposed RVS installation result in*:			
w. A risk of exposure to hazardous substances (including, but not limited to oil, pesticides, chemicals or radiation) during construction?	___	___	___
14. Infrastructure. *Will the proposed RVS installation result in*:			
x. A need for additional support facilities?	___	___	___
15. Socioeconomic. *Will the proposed RVS installation result in*:			
y. Changes in the population, employment, housing, schools, commercial/industrial activities, security of the area?	___	___	___

16. Mandatory Findings of Significance. *Will the proposed RVS installation result in:*

	Potential Impact?		
	Yes	Maybe	No
qq. Potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of major periods of the State's history or prehistory?	___	___	___
rr. Impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	___	___	___

DETERMINATION OF ENVIRONMENTAL DOCUMENT

On the basis of this initial evaluation:

☐ It has been found that the proposed project COULD NOT have a significant effect on the environment, and a NEPA document should not be prepared. The project qualifies for a Categorical Exclusion.

☐ It has been found that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measure(s) described on the attached sheet have been added to the project. An Environmental Assessment should be prepared.

☐ It has been found that the proposed project, individually and/or cumulatively MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT STATEMENT (EIS) is required.

Signature ______________________________ Date __________

Title ______________________________

EXPLANATION TO RESPONSES

INITIAL STUDY CHECKLIST

Project:
Agency:

1. **Geology, Soils and Topography**
    a.
    b.
    c.
2. **Water Resources**
    d.
    e.
    f.
    g.
    h.
    i.
    j.
3. **Air Quality**
    k.
    l.
4. **Botanical Resources**
    m.
    n.
    o.
    p.
    q.
5. **Fish and Wildlife**
    r.
    s.
    t.
    u.
    v.
6. **Agriculture**
    w.
    x.
    y.
7. **Natural Resources**
    z.
8. **Cultural Resources**
    aa.
    bb.
    cc.
    dd.
    ee.
    ff.
9. **Land Use and General Plan Consistency**
    gg.
    hh.
    ii.
10. **Recreation**
    jj.
11. **Aesthetics**
    kk.

12. **Utilities**
    ll.
    mm.
13. **Hazardous Materials**
    nn.
14. **Infrastructure**
    oo.
15. **Socioeconomic**
    pp.
16. **Mandatory Findings of Significance**
    qq.
    rr.

REGIONAL INS ENVIRONMENTAL OFFICER REVIEW

On the basis of this initial evaluation:

☐ I have reviewed the Project Environmental Review Checklist and the proposed project COULD NOT have a significant effect on the environment, and a NEPA document should not be prepared.

☐ I have reviewed the Project Environmental Review Checklist and sufficient information regarding the potential impacts of the project is missing. Additional information or investigations are necessary.

☐ I have reviewed the Project Environmental Review Checklist and the proposed project, individually and/or cumulatively MAY have a significant effect on the environment, and additional NEPA documents are required.

Name ______________________________

Title ______________________________ Date ____________

Signature ______________________________

Last Updated 5/20/02

SECTION 3.0
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This PEA documents an analysis of potential impact associated with a 10-year program to install RVS systems within the Central Region of INS. As a programmatic document, or planning level analysis, many precise details of the program are not known and are deferred to a later time when additional environmental compliance activities would be undertaken. Each location where RVS systems will be installed is part of an integrated program for addressing the purpose and need and therefore represents a Federal action requiring NEPA analysis.

At the present time, expanding the use of RVS systems in the Central Region includes the installation of up to 1,556 additional RVS systems over the next 10 years. It should be noted that this number is a planning level analysis and the actual number of RVS systems required will vary depending upon enforcement strategies and their function will continually be evaluated on a site specific basis. Currently, the Central Region of INS is operating approximately 61 RVS systems with 30 in the El Paso Sector, 19 in the Del Rio Sector, and 12 in the Laredo Sector.

The Region Of Influence (ROI) for all alternatives includes those counties in the Central Region of INS that share an international border. More specifically, the ROI includes those counties illustrated in Figures 3-1 and 3-2 and listed by state in Table 3-1.

The potential for environmental affects vary by location and resource considered. An appropriate level of detail is reflected in the description of the different portions of the ROI and the effected environment for each resource.

3.1 Physical Resources

3.1.1 Soils

Penn State's Earth System Science Center (ESSC) has divided the central United States border region into seven broad land resource regions, which include the Rocky Mountain Range and Forest Region, Northern Great Plains Spring Wheat Region, Northern Lake States Forest and Forage Region, Western Range and Irrigated Region, and the Southwest Plateaus and Plains Range and Cotton Region (Figure 3-3).

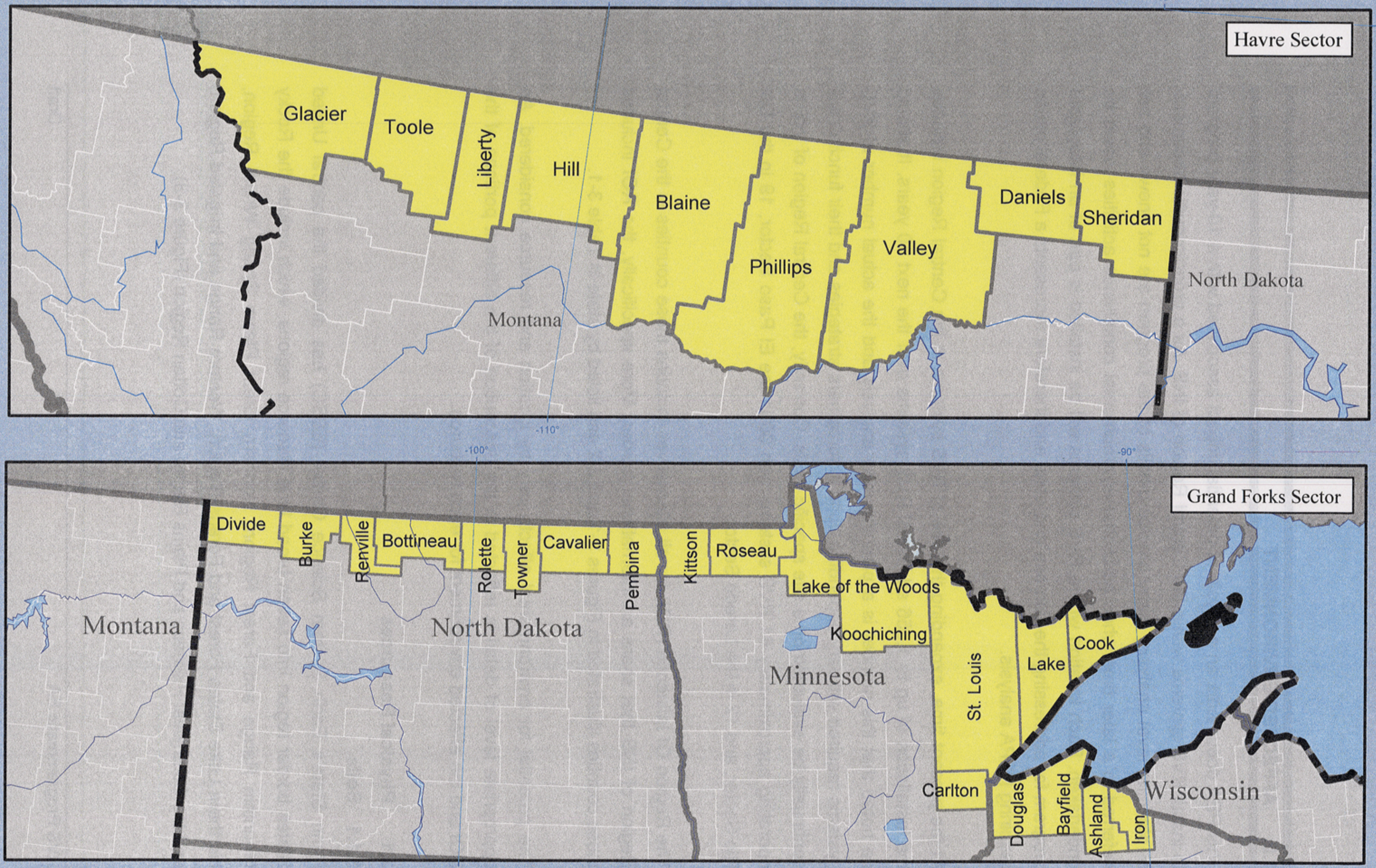


Figure 3-1 Counties in the ROI along the Northern Border

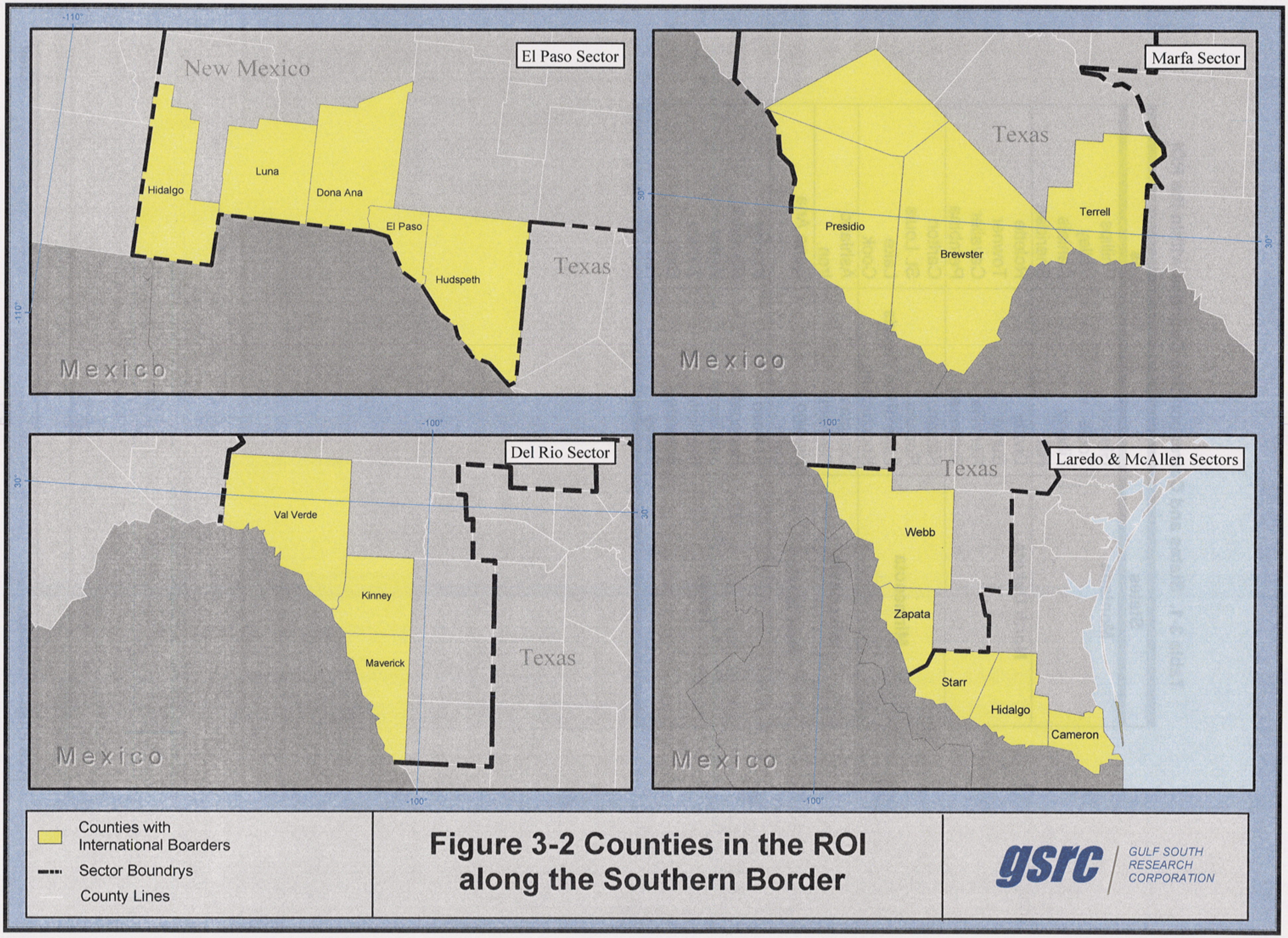
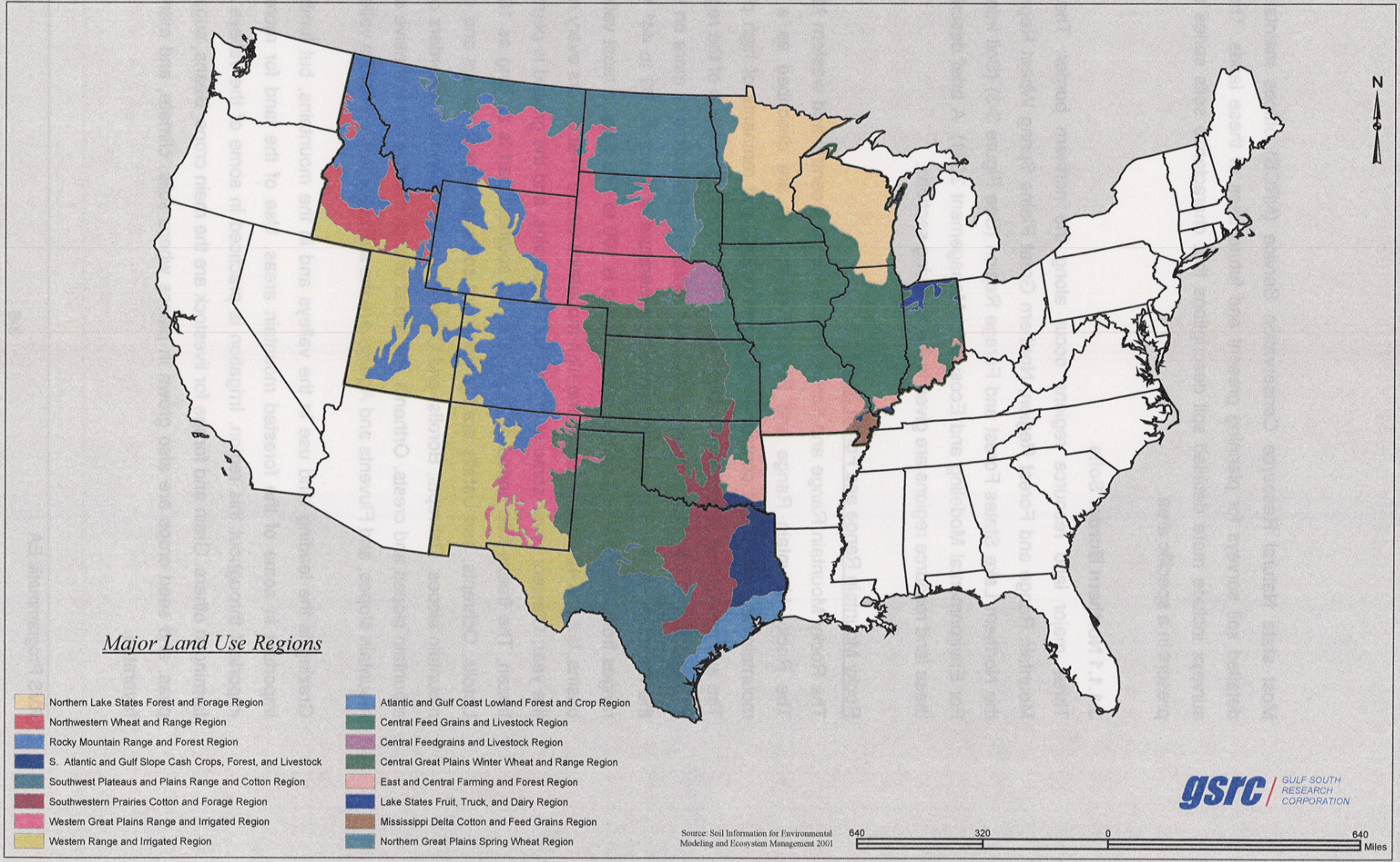


Figure 3-2 Counties in the ROI along the Southern Border

Table 3-1. States and Corresponding Counties within the ROI

States	Counties	
Montana	Glacier Toole Liberty Hill	Phillips Valley Daniels Sheridan
North Dakota	Divide Burke Renville Bottineau	Rolette Towner Cavalier Pembina
Minnesota	Kittson Roseau Lake of the Woods Koochiching	Carlton St. Louis Lake Cook
Wisconsin	Douglas Bayfield	Ashland Iron
New Mexico	Hidalgo Luna	Dona Ana
Texas	El Paso Hudspeth Jeff Davis Presidio Brewster Terrell	Kinney Maverick Webb Zapata Starr Hidalgo

Figure 3-3 Major Land Resource Regions Within the INS Central Region



Most state Natural Resource Conservation Service (NRCS) offices maintain more detailed soil surveys for planning present and future uses of these lands. These soil surveys include more detailed soil descriptions that characterize soils series that are present in a specific area.

3.1.1.1 Northern Border Soils

Three major land resource regions occur along the northern border: The Rocky Mountain Range and Forest Region, Northern Great Plains Spring Wheat Region, and the Northern Lake States Forest and Forage Region (See Figure 3-3) (Soil Information For Environmental Modeling and Ecosystem Management 2001). A brief description of these land resource regions are given in the following sections.

Rocky Mountain Range and Forest Region

The Rocky Mountain Range and Forest Region includes central and western Montana. The Rocky Mountain Range and Forest Region soils are described as a rugged mountainous region, that contain some broad valleys and remnants of high plateaus. The average annual precipitation ranges from 20 to 40 inches in much of the region, but it is less than 9.8 inches in some valleys and more than 50 inches or more on some of the mountain peaks. The average annual temperature is generally 39 to 44° F, but it ranges from 35 to 50° F. The freeze-free period is 100 to 140 days in most valleys and basins, but it is 40 days or less in the high mountains where frost occurs every month of the year. Glaciers cover some of the highest mountains, and the ground is permanently frozen. The freeze-free period on foothills in the southern part is as long as 160 days. Ustolls, Ochrepts, and Ustalfs are the dominant soil suborders in valleys and on lower mountain slopes. Ochrepts, Borolls, and Orthents are the dominant suborders on upper mountain slopes and crests. Orthents and areas of rock outcrop are extensive on steep mountain slopes, and Fluvents and Aquolls are the soil suborders present in valleys.

Grazing is the leading land use in the valleys and in the mountains, but lumbering is important in some of the forested mountain areas. Use of the land for recreation is important throughout this region. Irrigation is practiced in some of the valleys and dry farming in others. Grain and forage for livestock are the main crops. Beans, sugar beets, peas, and seed crops are also grown in places where soils, climate, and markets are favorable.

Northern Great Plains Spring Wheat Region

The Northern Great Plains Spring Wheat Region includes the area from central Montana to the extreme western portion of Minnesota. Soils are described as fertile, with smooth topography dominating the region that is favorable for agriculture, but the low precipitation and short growing season severely limit the crops that can be grown. The average annual precipitation ranges from 9 to 22 inches. A large part of the precipitation falls during the growing season. The average annual temperature is 39 to 48 °F in most of this region. The freeze-free period ranges from 100 to 155 days, increasing from north to south.

Borolls and Aquolls are the dominant soil suborders in this region. Borolls are on uplands, and Aquolls are in low wet areas and along streams. Aquolls are extensive in the Red River Valley in the eastern part of the region. Some of the Borolls have a high content of sodium, and some of the Aquolls have a high content of sodium and lime. Other important soil sub orders are Orthents on steep slopes and Ustolls in the southern part of the region. Spring wheat grown by dry farming methods is the major crop. Other spring grains, flax, and hay are also grown. Potatoes, sugar beets, soybeans, and corn are important crops in the Red River Valley.

Northern Lake States Forest and Forage Region

The Northern Lake States Forest and Forage Region includes western Minnesota east through Wisconsin. In the region, soils are poorly suited for cultivation due to the short, cool growing seasons, which severely limit agriculture in this region. The average annual precipitation ranges from 20 to 32 inches with maximum rainfall occurring during the growing season. The average annual temperature is 35 to 44° F, and the freeze-free period ranges from 95 to 145 days.

The more or less freely drained Boralfs are the dominant soil suborders. Aqualfs and Aquepts suborders occur on wet uplands and in depressions. Psamments and Orthods suborders mainly in the northeast) are on sand plains. The soil order Histosols are located in wet low areas and in bogs. A large part of this region is forested, and lumbering and recreation are the principal uses. Mining is a major industry in all parts of the region except in the east. Forage and some grains grown for dairy cattle and other livestock are the main crops in the farmed areas. Locally, potatoes and vegetables for canning are important crops within the region (Soil Information For Environmental Modeling and Ecosystem Management 2001).

3.1.1.2 Southern Border

The southern border is divided into four land resource regions: the Western Range and Irrigated Region, the Western Great Plains and Irrigated Region, the Southwest Plateaus and Plains Range and Cotton Region, and the Atlantic and Gulf Coast Lowland Forest and Crop Region occur near the south central border (See Figure 3-3); however, only the Western Range and Irrigated Region, and the Southwest Plateaus and Plains Range and Cotton Region occur in the ROI (Soil Information For Environmental Modeling and Ecosystem Management 2001). A brief description of these land resource regions are given in the following sections.

<u>Western Range and Irrigated Region</u>

The Western Range and Irrigated Region includes southern New Mexico and west Texas east to Brewster County. This is a semi-desert to desert region of plateaus, plains, basins, and many isolated mountain ranges. The average annual precipitation is 9.8 inches or less in most of the plains and basins but more than 50 inches falls annually on some of the higher mountains. In the southern portion of the region, most of the precipitation falls as rain during the warm season, but elsewhere most of the precipitation falls during the cool season. In most of this region, the average annual temperature is 44 to 55° F, but it ranges from 36° F at the higher elevations in the north to more than 70° F in some of the lowlands in the south. The freeze-free period ranges from less than 90 days in the north and in some of the higher mountains, to more than 240 days in the southern portion of the region.

Orthids, Fluvents, Orthents, and Xererts are soil suborders found extensively on the plains and plateaus and in valleys throughout the region. Xerolls, Ochrepts, and Boralfs suborders occur on mountain slopes. While the Argids suborder occur on plains and in basins. The Orthents suborder occurs primarily on mountain slopes. Much of the land in this region is used for range, but irrigation is practiced in places where water is available and the soils are suitable. Feed crops for livestock are grown on much of the irrigated land while peas, beans, and sugar beets are common commercial crops.

Southwest Plateaus and Plains Range and Cotton Region

The Southwest Plateaus and Plains Range and Cotton Region spans from eastern Brewster County, Texas to the Gulf of Mexico at the southern tip of Texas. This region is in the warmer part of the southern Great Plains. High temperatures accompany moderate precipitation, and precipitation effectiveness is low. The average annual precipitation is 20 to 30 inches throughout most of the region, but extremes in the region range between 15 and 35 inches. Generally, much of the precipitation falls in spring and in autumn. The average annual temperature ranges from 61 to 72° F. The freeze-free period ranges from 210 to more than 325 days, increasing in length from north to south. Freeze-free years are common in the extreme southern part of the region.

The major soil suborders on uplands are Argids and Orthids in the west and Ustalfs, Ustolls, and Usterts in the east. Ustolls and Usterts are especially prominent in the southeast. The shallow Orthents suborder occurs on uplands throughout the region. Soil temperatures generally are higher than 72° F south of the Edwards Plateau. Slopes range from steep to nearly level. Rangeland is the dominant land use in most of this region, but wheat, grain sorghum, and other small grains are grown in places where soils, topography, and moisture supply are favorable. Cotton grown under irrigation is important in the southeast portion of the region. Citrus fruits and winter vegetables are grown in the lower Rio Grande Valley (Soil Information For Environmental Modeling and Ecosystem Management 2001).

3.1.1.3 Prime and Unique Farmland

The Farmland Protection Policy Act of 1980 and 1995 requires identification of proposed actions that would affect any lands classified as prime or unique farmlands. The NRCS describes prime farmland as having the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. (7U.S.C. 4201(c)(1)(A)). Unique farmland is farmland other than prime farmland, that is used for the production of specific high-value food and fiber crops such as citrus, tree nuts, olives, cranberries, fruits, and vegetables. (7 U.S.C. 4201(c)(1)(B)). Additional farmland of statewide or local importance, is land identified by state or local agencies for agricultural use, but not of national significance. (7 U.S.C. 4201(c)(1)(C)). The NRCS administers this act to preserve farmlands and reduce that rate at which farmlands are converted to non-agricultural uses. Coordination with local NRCS offices is necessary to determine if a proposed action will affect any lands classified as prime or unique farmlands.

Summary of Procedures for Determining Prime Farmland

To determine if prime or unique farmlands are present in an area that may be affected by a proposed action, the following steps must be taken to ensure all guideline provisions are followed:

1. Consult with appropriate NRCS State office or USDA State Land Use Committee chairperson for technical data and assistance. First, examine the NRCS Important Farmlands Inventory/Important Farmlands Maps (7 CFR Part 657.1). Then examine the NRCS Statewide list of soil mapping units and results of standard soil surveys (7 CFR Part 657.4).

2. If the proposed action may have an adverse effect on a prime or unique farmland, then an environmental assessment should be prepared. If an EIS is to be prepared, USDA should review the draft EIS.

3. Identify alternatives or appropriate mitigation measures.

3.1.2 Cultural Resources

3.1.2.1 Cultural Overview

The NHPA of 1966 establishes the Federal government's policy to provide leadership in the preservation of historic properties and to administer Federally owned or controlled historic properties in a spirit of stewardship. The NHPA established the Advisory Council on Historic Preservation (ACHP) to advocate full consideration of historic values in Federal decision-making; review Federal programs and policies to promote effectiveness, coordination, and consistency with national preservation policies; and recommend administrative and legislative improvements for protecting our Nation's heritage with due recognition of other national needs and priorities. In addition the NHPA also established the State Historic Preservation Officers (SHPO) to administer national historic preservation program on the state level and Tribal Historic Preservation Officers (THPO) on tribal lands where appropriate. The NHPA also establishes the National

Register of Historic Places (NRHP). The NRHP is the Nation's official list of cultural resources worthy of preservation and protection. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Park Service administers the NRHP.

Section 106 of the NHPA requires the USBP to identify and assess the effects of its actions on cultural resources. The USBP must consult with appropriate State and local officials, Indian tribes, applicants for Federal assistance, and members of the public and consider their views and concerns about historic preservation issues when making final project decisions. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the Council. Revised regulations, "Protection of Historic Properties" (36 CFR Part 800), became effective January 11, 2001.

Several other important pieces of legislation include the Native American Graves Protection and Repatriation Act (NAGPRA), along with EO 13007 and EO 13175. NAGPRA mandates the USBP to summarize, inventory, and repatriate cultural items in the possession of or control of the Federal agency to lineal descendants or to culturally affiliated Federally recognized Indian tribes. The Act also requires that certain procedures be followed when there is an intentional excavation of or an inadvertent discovery of cultural items. EO 13007 was issued on May 24, 1996 in order to facilitate the implementation of the American Indian Religious Freedom Act of 1978. It specifically charges Federal agencies to: (1) accommodate, to the extent practical, American Indian access to and use of sacred sites by religious practitioners; (2) avoid adversely affecting the physical integrity of sacred sites; and (3) to maintain the confidentiality of these sites. EO 13175 outlines the official U.S. government policy on consultation and coordination with American Tribal governments. The order emphasizes formal recognition of the American Indian Tribes' status as…"domestic independent nations: that have entered into treaties with the U.S. guaranteeing their right to self government. It stipulates that this consultation would be done on a "government to government basis."

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources are typically divided into three major categories: archaeological resources, architectural resources, and traditional cultural resources.

Archaeological resources are locations where prehistoric or historic activity measurably altered the earth or produced deposits of physical remains (e.g., arrowheads, bottles). *Architectural resources* include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for inclusion in the NRHP. However, more recent structures, such as Cold War era resources, may warrant protection if they manifest "exceptional significance" or the potential to gain significance in the future. *Traditional cultural resources* are resources associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community. Traditional resources may include archaeological resources, locations of historic events, sacred areas, sources of raw material used to produce tools and sacred objects, topographic features, traditional hunting or gathering areas, and native plants or animals.

Under Federal regulation, only significant cultural resources warrant consideration with regard to adverse impacts resulting from a Federal undertaking. Significant archaeological, architectural, and traditional resources include those that are eligible or recommended as eligible for inclusion in the NRHP. The significance of Native American and Euroamerican archaeological resources is evaluated according to the criteria for eligibility to or inclusion to the NRHP as defined in 36 CFR 60.4 and in consultation with the SHPO. As established in the following criteria, the quality of significance is present in districts, sites, buildings, structures, and objects that:

1. are associated with events that have made a significant contribution to the broad patterns of history, or
2. are associated with the lives of persons significant in the past, or
3. embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value or represent a significant and distinguishable entity whose components may lack individual distinction, or
4. have yielded, or may be likely to yield information important in prehistory or history.

Appendix B includes a list of all NRHP listed properties in the counties comprising the ROI along with the closest town. In addition to these resources, there can be properties and sites that are NRHP-eligible but are not listed on the NRHP as well as traditional cultural resources. It should also be noted that this list only represents known cultural resources and is not an extensive list of all cultural resources within the region. The NRHP is constantly being updated and revised with new properties.

3.1.2.2 The Section 106 Review Process

The USBP must determine whether it's undertaking could affect cultural resources in order to initiate the Section 106 review process. If there is no potential to affect historic properties then the USBP has no further Section 106 obligations. If there is a potential that either known or unknown historic properties could be affected then the USBP must identify the appropriate SHPO and/or THPO to consult with during the process. In addition the USBP should also plan to involve the public, and identify other potential consulting parties such as the appropriate Federally recognized tribes that may claim a cultural affinity to the Area of Potential Effect (APE).

Once that it has been determined that the USBP's undertaking could affect known or potential cultural resources it is necessary to identify all cultural resources within the APE. As a result the USBP would conduct reviews of background information, consult with SHPO/THPO as well as others, seek information from knowledgeable parties, and conduct additional studies as necessary. Often these efforts would include a standing structures survey and archaeological survey of the area in order to identify potential cultural resources that may be impacted. Cultural resources that are identified are evaluated against the National Park Service's published criteria outlined above in order to determine if they are eligible for inclusion on the NRHP. If the USBP finds that no potentially eligible or eligible cultural resources are present or affected it then provides documentation to the SHPO/THPO and barring any objections proceeds with its undertaking. If potentially eligible or eligible cultural resources are present then the USBP will proceed to assess possible adverse impacts

The USBP, in consultation with the SHPO/THPO, makes an assessment of potential adverse effects on the identified cultural resources based on the criteria found in the ACHP's regulations. Potential adverse impacts may include but are not limited to:

- physical destruction or damage
- alteration inconsistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (see www2.cr.nps.gov/tps/secstan1.htm for more information)
- relocation of the property
- change in the character of the property's use or setting
- introduction of incompatible visual, atmospheric, or audible elements
- neglect and deterioration
- transfer, lease, or sale out of Federal control without adequate preservation restrictions

If the SHPO and/or THPO agree that there will be no adverse effect, the USBP would proceed with the undertaking and any agreed upon conditions. If it is determined that there is an adverse effect the USBP would begin consultation to seek ways to avoid, minimize, or mitigate the adverse effects.

The USBP would consult with the appropriate SHPO and/or THPO and others who may include Indian tribes and Native Hawaiian organizations, local governments, permit or license applicants, and members of the public to resolve adverse effects to cultural resources. The ACHP may also participate in the consultation process. The consultation process usually results in a Memorandum of Agreement (MOA) which outlines the agreed-upon measures that the USBP would take to avoid, minimize, or mitigate the adverse effects. If the MOA is executed the USBP would proceed with its undertaking under the terms of the MOA and the Section 106 process is complete.

3.1.2.3 Cultural History

Prehistoric occupation in the United States is generally divided into three major periods that vary regionally: the Paleo-Indian Period, dating from ca. 12,000 B.C. to ca [varies regionally] B.C., the Archaic Period (ca. [varies regionally]) B.C. to ca. [varies regionally] B.C.), and, in the East and Midwest, the Woodland Period; in the West, the Formative Period, or the Fremont Period, and the Late Prehistoric Period; and in the South, the Woodland and Mississippian Periods. These periods are commonly subdivided into smaller temporal phases based on particular characteristics of the artifact assemblages encountered in each of the archeological regions of the United States. The prehistoric periods and corresponding phases are defined by the presence of particular diagnostic artifacts such as projectile points, certain types of pottery, and occasionally, particular site locations. For the Historic period, documentary information more often is used to distinguish certain phases; nevertheless, particular artifacts also can be used to recognize certain historic affiliations.

Paleo-Indian (10,000-[varies regionally] B.C.)

The nature and temporal position of the first people in southern Arizona is a subject of debate. Most researchers contend that successive migrations occurred throughout the latter part of the Pleistocene, coinciding with global temperature drops that resulted in massive quantities of water being frozen. As the ice caps increased in size, sea levels dropped, exposing land bridges in the areas where the sea was the most shallow. One of these land bridges connected Alaska with Siberia across the Bering Strait. This land bridge has successively appeared and disappeared over the last 100,000 years as temperatures fluctuated. "Early man sites" or Pre-clovis sites in the New World, those defined as being occupied prior to 12,000 years ago, have been reported within the United states but are not wholly accepted. The Paleo-Indian people hunted large and small game and gathered wild edible plants for subsistence. Artifacts from this period include lanceolate, fluted spear points along with scrapers, gravers, choppers, and knives chipped from stone.

Archaic ([varies regionally]-[varies regionally] B.C.)

The cultural remains of Archaic people, post-Pleistocene foragers, are more common manifestations than those of Paleo-Indian populations. By about 10,000 B.P. a gradual change to a warmer, drier environment resulting in the extinction of many of the big game animals stimulated a change in adaptive strategies. This change in adaptive strategies is referred to as the archaic period, and was reflected in the tool content of these cultures. Grinding equipment for the processing of vegetal foods, roasting ovens, rock-lined hearths, a more restricted and perhaps more consistently scheduled pattern of mobility indicated by intensive repeated occupation at some sites, local resource usage, and a variety of notched stemmed projectile point-knives serve to differentiate Archaic complexes from those of the proceeding Paleo-Indian Period. The archaic period also saw the utilization of a diverse array of modern species in diffuse foraging economies, along with a greater reliance on plant food resources. Faunal remains recovered from these sites included bones of fish, deer, turkey, squirrel, prairie chicken, raccoon, and other small game.

Woodland Period (varies regionally)

The Woodland Period is generally seen as the transition between the Late Archaic and the agricultural Mississippian Period cultures. The people of this period continued hunting and gathering practices as those of the earlier archaic period but in addition adopted farming (squash, sunflowers, and corn), pottery making, and in some areas the use of the bow and arrow.

Mississippian Period (varies regionally)

The Mississippian Period has been identified in the Southeast. . This period is marked by several distinctive cultural traits, including flat-topped temple mounds, the use of shell temper in ceramics, distinctive ceramic forms such as effigy vessels, elaborate burial ceremonialism, the establishment of small villages, and the cultivation of maize, beans and squash.

Late Prehistoric Period (varies regionally)

The Late Prehistoric Period is identified in some areas of the Southwest, particularly Texas and Colorado. The period is marked by the introduction of new technologies such as the bow and arrow along with continued population growth in the region. This period marked the tranisition from nomadic hunters and gatherers relying on wild plants and animals to a more sedentary people who practiced agriculture and lived in more hierarchical chiefdom societies. Agricultural remains include maize and typical archaeological remains include ceramic pottery, storage pits, hearths, and small triangular projectile points.

Formative (varies regionally)

This Formative Period is identified in some areas of the west following the Archaic. The Formative period refers to the prehistoric ceramic-making agriculturists. It was during this period that agriculture was introduced into the area. As a result groups became more sedentary, living longer in one location. Small villages and the remains of their pithouses and masonry can be identified archaeologically. Different stages or phases within the Formative Period are characterized by the presence of ground stone tools, used for processing food, specific ceramic types, and remains of structures including pithouses.

Freemont Period (varies regionally)

The Freemont Period has been identified by archaeologist in Colorado and the Great Basin. It is largely defined by the adoption of agriculture (i.e. squash, sunflower, beans, and maize) but also included full and part-time farmers and foragers, dependent on location and season. The Period is also known for the appearance of semi-subterranean structures and storage pits as well as above ground granaries.

Historic Period (varies regionally)

The Historic period in the souuthwest began with the Spanish explorations by Fray Marcos de Niza in 1539 and Francisco Vasquez de Coronado, Melachor Diaz, and Alarcon in 1540. In 1543, a party under Hernando De Soto discovered the Mississippi River while engaged in a lengthy journey through what is now the American Southeast. Landing in Florida in 1539, they passed through modern Georgia, North and South Carolina and Tennessee, and eventually reached the Mississippi River. There, on the west bank of the river, in the Indian province of Guachoya, De Soto died in late May of 1542 and his men, fearing local natives might defile his body, placed it in the river. Shortly thereafter, the remnants of the party attempted to reach the Spanish settlements in Nueva España by marching west, but this effort failed and they returned to the Mississippi River, where they constructed boats and sailed downstream, reaching the Gulf of Mexico in July 1543 (Swanton 1979). The interior parts of the Unites States did not see European contact till much later. This initial contact was the result of the expeditions of Lewis and Clark, along with French and English Fur traders, and French Catholic Missionaries. These initial contacts were devastating on Indian populations. Native American populations experienced extreme population decline and relocation during this early contact period. Contact period resources could include archaeological sites, objects and standing structures or remains of structures. The Historic period continues to the present time. Each state has a set of historic contexts that have been defined by that state's SHPO and sis used as a context for evaluating the NRHP eligibility of resources.

3.1.3 Water Resources

The primary Federal law that protects waters of the United States is the Clean Water Act (CWA) of 1972. This Act was passed by Congress with two major goals: 1) to prohibit the discharge of pollutants into waters, and 2) to improve water quality levels to where they are safe for recreation and wildlife and fisheries purposes. This act protects all waters of the U.S. from streams and rivers to lakes, reservoirs, and even aquifers. Each state has a water resources division that is required to identify water bodies that do not meet EPA standards. Along with implementing Federal regulations, these statewide departments offer further protection to the local water resources:

- Montana Department of Environmental Quality, Water Resources Division
- North Dakota State Water Commission
- Minnesota Department of Natural Resources, Waters
- Wisconsin Department of Natural Resources, Division of Water
- New Mexico Environment Department
- Texas Water Development Board
- Texas Natural Resource Conservation Commission

Another Federal law that protects water resources is the Safe Drinking Water Act (SDWA), which was passed by Congress in 1974. Since 1974, the SDWA has been amended twice. This Act was designed to regulate all public drinking water supplies, such as public wells, springs, lakes, and rivers, in order to protect public health. The EPA is responsible for setting the drinking water standards.

Individual abbreviated EAs will be developed for each of the proposed RVS sites. These EAs will further discuss site-specific surface and groundwater features that may be affected by the proposed project. A general discussion on surface and groundwater can be found below. This PEA addresses general water resources found in those border counties in the ROI.

3.1.3.1 Surface Water

Northern Border

Major surface water systems along the northern border are in intricate network of streams, rivers, lakes, ponds, and reservoirs. These states contain numerous smaller water bodies and the quantity increases from west to east. Western Montana is characterized by the Rocky Mountains and moving eastward through much of North Dakota, there is little surface water and few streams and rivers. Eastern North Dakota, Minnesota, and Wisconsin experience a higher rainfall and more surface waters due to the temperate climate.

The Red River runs south-north and is the border between North Dakota and Minnesota. Minnesota and Wisconsin contain the most surface waters of the four northern border states in the ROI. The two states share part of their northern border with Lake Superior and other international waters. Much of Minnesota and Wisconsin are covered with small lakes with many streams and rivers linking them. Along with Lake Superior, Minnesota shares Rainy Lake and Lake of the Woods with Canada. These lakes are connected by Rainy River, which eventually flows into Lake Superior. The St. Louis River empties into Lake Superior at the Wisconsin and Minnesota State Border.

Surface water pollution comes from various sources depending on the state. Montana's main source is from non-point sources, while North Dakota, Minnesota, and Wisconsin list runoff from agriculture and industry as their primary sources. Wisconsin also has a problem with airborne pollutants, especially mercury, settling into lakes (EPA 2001c).

Southern Border

Much of the ROI along the southern border is considered arid; however, in south Texas, towards the Gulf of Mexico, the climate tends to get more semiarid or subtropical and water bodies increase closer to the coast (U.S. Forest Service (USFS) 2001). The arid climate over much of the southern ROI results in the majority of the drainage channels being dry most of the year; however, moisture amounts tend to increase traveling west to east. Rivers and streams that flow periodically due to fluctuations in precipitation are referred to as being ephemeral. Intermittent waterways are those that flow as a result of seasonal precipitation for the most part. Perennial waterways are those that have permanent water throughout the year.

There are no major surface waters within the border counties of New Mexico except the Rio Grande in Dona Ana County. Texas is bound on the south by the Rio Grande from the New Mexico-Texas state line to the Gulf of Mexico. The Rio Grande also serves as the international border between Texas and Mexico. Amistad and Falcon International Reservoirs are the two major surface water bodies located along the Rio Grande in Texas.

Runoff in the form of agricultural, sewage, and recreational activities account for the major surface water pollutants in New Mexico and Texas. In New Mexico, non-point sources account for over 90% of their water pollution problems (EPA 2001c).

3.1.3.2 Ground Water

Northern Border

There are six major aquifer systems found in the northern border ROI (Table 3-2). Most of the primary aquifers in the area are created from sandstone. Sandstone aquifers typically have low to moderate water conductivity; however, since they cover large amounts of area, these aquifers produce large quantities of water (USGS 2001). The

Table 3-2. Primary Aquifers Along the Northern Border

State	Aquifer	Rock Type
Montana	Northern Rocky Mountain Intermontane Basins aquifer system	Unconsolidated sand and gravel aquifer
	Lower Tertiary aquifers	Sandstone aquifer
	Lower Cretaceous aquifers	Sandstone aquifer
	Paleozoic aquifers	Sandstone and carbonate-rock aquifer
	Upper Cretaceous aquifers	Sandstone aquifer
North Dakota	Lower Tertiary aquifers	Sandstone aquifer
	Upper Cretaceous aquifers	Sandstone aquifer
	Paleozoic aquifers	Sandstone and carbonate-rock aquifer
	Lower Cretaceous aquifers	Sandstone aquifer
Minnesota	Lower Cretaceous aquifers	Sandstone aquifer
	Cambrian-Ordovician aquifer system	Sandstone aquifer
Wisconsin	Cambrian-Ordovician aquifer system	Sandstone aquifer

Source: EPA 2001c.

majority of the population in Montana, North Dakota, Minnesota, and Wisconsin rely on groundwater as their main source of drinking water (EPA 2001c).

Pollution to aquifer systems is becoming a problem for the four northern border states. Increases in population along the international border and the human activities associated with these increases bring new threats to the aquifers. Other pollution sources occur from agricultural and petroleum facilities, poor methods of waste disposal, and pesticides. Montana is implementing a new statewide groundwater protection plan to combat their pollution problems. North Dakota, Minnesota, and Wisconsin have on-going assessments of groundwater and protection programs designed to help alleviate pollution problems and clean-up efforts (EPA 2001c).

Southern Border

Four major aquifer systems are found in the counties along the southern borders of New Mexico and Texas (Table 3-3). These aquifers are primarily made of sand except for the Edwards-Trinity aquifer system, which is formed of sandstone and carbonate-rock. Semiconsolidated sand aquifers found in south Texas "are of fluvial, deltaic, and shallow marine origin" and tend to consist of saline water (USGS 2001). New Mexico and west Texas borders have primarily unconsolidated sand and gravel aquifers. The unconsolidated aquifers in the southwestern U.S. are called basin-filled aquifers. They tend to have fairly good water supply features and some are linked to nearby carbonate-rock aquifers (USGS 2001). While less than half of the state of Texas relies on groundwater as their primary water supply, approximately 90% of New Mexico uses groundwater as their main source (EPA 2001c).

Table 3-3. Primary Aquifers Along the Southern Border

State	Aquifer	Rock Type
New Mexico	Rio Grande aquifer system	Unconsolidated sand and gravel aquifer
Texas	Rio Grande aquifer system	Unconsolidated sand and gravel aquifer
	Edwards-Trinity aquifer system	Sandstone and carbonate-rock aquifer
	Texas coastal uplands aquifer system	Semiconsolidated sand aquifer
	Coastal lowlands aquifer system	Semiconsolidated sand aquifer

Source: EPA 2001c.

Primary sources of groundwater pollution in New Mexico and Texas come from industrial sources, such as mining and petroleum, and poor waste disposal practices (EPA 2001c).

Ground water protection programs have been established in both New Mexico and Texas.

3.1.3.3 Wetlands and Waters of the U.S.

Jurisdictional Wetlands and Waters of the U.S.

Section 404 of the CWA of 1977 (P.L. 95-217) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States are further defined as all other waters such as intrastate lakes, rivers, streams, mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, or impoundments of waters, tributaries of waters, and territorial seas.

Jurisdictional wetlands are defined as "areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.3). Three mandatory technical criteria for determining the presence of a wetland are (1) hydric soils, (2) hydrophytic vegetation, and (3) wetland hydrology. Jurisdictional wetlands as outlined by the U.S. Army Corps of Engineers (USACE) *Field Guide for Wetland Delineations* (1987) are referred to as "wetlands" throughout this section.

Activities that result in the dredging and/or filling of jurisdictional Waters of the United States including wetlands are regulated under Section 404 of the CWA. The USACE has established Nationwide Permits (NWPs) to efficiently authorize common activities, which do not significantly impact waters of the U.S. The NWPs were modified and reissued by the USACE in the Federal Register (Volume 61, Number 241) on 13 December 1996, with an effective date of 11 February 1997. The USACE has the responsibility to authorize permitting under a NWP, or to require an Individual Permit. The Supreme Court ruling in the Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers case ("SWANCC", Case No. 99-1178) on January 9, 2001 restricted the Environmental Protection Agency and U.S. Army Corps of Engineer's regulatory authority under Clean Water Act. This ruling eliminates the CWA jurisdiction over isolated, non-navigable, and intrastate waters used as habitat by migratory birds. Waters of the United States specifically affected by the SWANCC ruling include: intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs prairie potholes, wet meadows, playa lakes, or natural ponds.

Wetland Types

There are many wetland types along the northern and southern border regions of the United States. Wetlands are abundant due to tidal effect of the Gulf of Mexico in the south and the glaciated region of the north, coupled with the influence of Lake Superior on Wisconsin and Minnesota create an eclectic landscape. Wetland types within the ROI include wet meadows, prairie potholes, playa lakes, bottomland hardwoods, tidal marshes, northern bogs, and fens.

Over the past century wetlands have experienced intensive use, modification, degradation, and more recently, efforts at conservation. Degradation of wetlands takes many forms. Flash flooding and extensive drying are probably most influential in wetland modification; however, siltation, cattle grazing, algal pathogens, and various human effects such as water diversions, farming practices, introduction of exotic species, and recreational abuse may have detrimental effects on these unique habitats. Current efforts to manage and conserve these habitats for a variety of uses are underway, supported by government programs, non-profit organizations, and concerned land owners.

Wetlands are invaluable natural resources that recharge groundwater supplies, reduce the likelihood of flooding by storing storm water runoff, and provide critical habitat for the survival of wildlife species. Historically, wetlands have been altered at an alarming rate due to poor farming practices, urban sprawl, and lack of education on the function and values of wetlands. The inception of the CWA has provided protection for wetlands and strict consequences for those who violate this Act.

Northern Border Wetland Types

The north central border regions include the states of Wisconsin, Minnesota, North Dakota, and Montana to Glacier County. A total of 19,268,692 square miles of wetlands are among these north central states, of which many are located along the northern borders (Tiner 1999). Many of these northern areas are glacially formed depressions carved out by glacial action, formed by melting ice blocks left when the Wisconsin glacier retreated about 10,000 to 12,000 years ago. This formerly glaciated landscape is pocket marked with an immense number of palustrine wetlands that include prairie potholes, wet meadows, bogs, forested swamps, and fens. The hydrology of palustrine wetlands is affected by precipitation, surface water runoff, and groundwater discharge in varying combinations. Palustrine wetlands may be flooded permanently, periodically, or never flooded, but must be saturated for extended periods during the year. Palustrine wetlands are dominated by trees, shrubs, and persistent herbaceous plants that occur primarily in freshwater areas (Tiner 1999).

Prairie potholes are glacially formed wetlands characteristic of the Upper Midwest. Vegetation forms concentric bands of aquatic vegetation ranging from submerged and floating aquatic plants to herbaceous vegetation growing closer to the shore. The upper Midwest is described as being one of the most important wetland regions in the world. These areas are home to more than half of all North American migratory waterfowl; while at the same time, nearly half of all the regions original prairie pothole wetlands are gone due to poor agricultural practices (EPA 2001d).

Wet meadows are a type of marsh that commonly occurs in poorly drained areas such as shallow lake basins, low lying farmland, and the land between shallow marshes and upland areas. Wet meadows resemble grasslands in many ways except during periods of seasonal high water. These meadows are synonymous with nutrient rich soils, which in turn has lead to destruction and encroachment due to farming (EPA 2001d).

Bogs are one of North America's most distinctive wetlands, in which they take hundreds, if not thousands of years to develop. Bogs are characterized by spongy peat deposits, acidic waters, and a floor of thick carpet of sphagnum moss. Bogs are unique in that they receive nearly all their water from precipitation. Historically, bogs declined rapidly as they were drained for cropland and mined for peat (Tiner 1999).

Fens are peat-forming wetlands that are generally associated with low temperatures and short growing seasons. Fens receive nutrients from sources other than precipitation and they are less acidic and have higher nutrient levels than bogs (EPA 2001d). Because of the large historical losses of this type of wetland, remaining fens are rare and protecting them has become crucial.

Forested swamps are often inundated with floodwater from nearby rivers and streams, which create highly organic nutrient rich soils. Over the past 200 years over 70 percent of the Nation's floodplain forested swamps have been lost for development and agriculture expansion (EPA 2001d).

Southern Border Wetland Types

From the arid regions of New Mexico to the humid climates of the Texas coast, the southern border includes a wide array of wetland types.

Southeastern Texas, which borders the Gulf of Mexico, has a vast amount of wetlands associated with its tidal marshes. Both tidal and nontidal marshes along with a scattering of coastal potholes account for the majority of the wetlands that border the Texas Gulf Coast.

The EPA defines marshes as frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to the saturated soil conditions. Marshes maybe fresh, brackish (somewhat salty), or saline depending on the distance from the Gulf of Mexico; with saline marshes located very near the Gulf and salinity decreasing as the distance from the Gulf increases. Tidal marshes serve many important functions. They serve as storm buffers from the sea, provide nesting habitat for migratory species, and offer vital food and habitat for seafood.

The Texas Parks and Wildlife Department (TPWD) reports some 89,000 acres of coastal potholes found in southeastern Texas. Many shorebirds, songbirds, migrating waterfowl, and waders are common to this type of habitat (Texas Water Resources Institute 2001).

West Texas and New Mexico's southern borders are arid regions that receive very little rainfall annually but do support such wetlands as riverine and riparian ecosystems. Riparian ecosystems are the dominant form of wetlands in this region. Riparian landscapes are defined as ecotones or corridors between terrestrial and aquatic realms (Malanson 1993). Riparian ecosystems provide essential habitat for many vertebrate species and provide critical physical and biological linkages between water and land (Gregory et al. 1991). Reproduction and growth of vegetation in riparian ecosystems are closely related with peak water flow and stream meandering. Thus, the establishment of riparian vegetation is diminished when stream flow is altered. Due to the scarcity of water resources in the southwest, riparian ecosystems have been altered by human activities centered on such resources. Some human impacts to rivers and streams in the southwestern regions are pumping for irrigation, channelization, and damming to create energy, of which all compromise the integrity of these valued riparian ecosystems.

The largest river system in the south central border region is the Rio Grande. The length of the river is 1,885 miles, of which 1,242 miles forms the border between Mexico and the United States (Rio Grande/Rio Bravo Basin Coalition 2001). The Rio Grande and its tributaries contribute to the majority of these wetland riparian zones in the ROI.

3.1.4 Air Quality

3.1.4.1 Applicable Air Quality Statutes

The U.S. Environmental Protection Agency (EPA) is the agency responsible for enforcing the Clean Air Act (CAA) of 1970 and its 1977 and 1990 Clean Air Act Amendments (CAAA). The purpose of the CAAA is to establish National Ambient Air Quality Standards (NAAQS), to classify areas as to their attainment status relative to the NAAQS, to develop schedules and strategies to meet the NAAQS, and to regulate emissions of criteria pollutants and air toxics to protect the public health and welfare. Under the CAA, individual states are allowed to adopt air quality standards and other regulations provided that they are at least as stringent as the Federal standards. The CAAA of 1990 established new deadlines for the achievement of NAAQS, depending on the severity of nonattainment.

3.1.4.2 Air Quality Management

The EPA established NAAQS, for specific pollutants determined to be of concern with respect to the health and welfare of the general public. The EPA defines ambient air quality in 40 CFR 50 as "that portion of the atmosphere, external to buildings, to which the general public has access". Ambient air quality standards are intended to protect public health and welfare and are classified as either "primary" or "secondary" standards. Primary standards define levels of air quality necessary to protect the public health. National secondary ambient air quality standards define levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. The major pollutants of concern, or criteria pollutants, are carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, suspended particulate matter less than ten microns, and lead. NAAQS represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect the public health and welfare. Short-term standards (1-, 8- and 24-hour averaging periods) are established for pollutants contributing to acute health effects, while long-term standards (annual averages) are established for pollutants contributing to long-term health effects. The NAAQS are included in Table 3-4. Areas that do not meet these standards are called non-attainment areas; areas that meet both primary and secondary standards are known as attainment areas.

Table 3-4. National Ambient Air Quality Standards

POLLUTANT	STANDARD VALUE*	STANDARD TYPE
Carbon Monoxide (CO)		
8-hour average	9ppm (10mg/m^3)	P
1-hour average	35ppm (40mg/m^3)	P
Nitrogen Dioxide (NO_2)		
Annual arithmetic mean	0.053ppm (100μ/m^3)	P and S
Ozone (O_3)		
1-hour average	0.12ppm (235μg/m^3)	P and S
8-hour average**	0.08ppm (157μg/m^3)	P and S
Lead (Pb)		
Quarterly average	1.5μg/m^3	P and S
Particulate<10 micrometers (PM-10)		
Annual arithmetic mean	50μg/m^3	P and S
24-hour average	150μg/m^3	P and S
Particulate<2.5 micrometers (PM-2.5)		
Annual arithmetic mean**	15μg/m^3	P and S
24-hour Average**	65μg/m^3	P and S
Sulfur Dioxide (SO_2)		
Annual arithmetic mean	0.03ppm (80μg/m^3)	P
24-hour average	0.14ppm (365μg/m^3)	P
3-hour average	0.50ppm (1300μg/m^3)	S

Source: EPA 2001a.

Legend: P = Primary S = Secondary
ppm = parts per million mg/m^3 = milligrams per cubic meter
μg/m^3 = micrograms per cubic meter
*Parenthetical value is an approximately equivalent concentration.
**The ozone 8-hour standard and the PM 2.5 standards are included for information only. A 1999 Federal court ruling blocked implementation of these standards, which EPA proposed in 1997. EPA has asked the U.S. Supreme Court to reconsider that decision.

The EPA requires each state to develop a State Implementation Plan (SIP) that sets forth how the CAA provisions will be implemented within that state. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain compliance with the NAAQS within each state. To provide consistency in different state programs and ensure that a state program complies with the requirements of the CAA and EPA, approval of the SIP must be made by the EPA. The purpose of the SIP is twofold. First, it must provide a strategy that will result in the attainment and maintenance of the NAAQS. Second, it must demonstrate that progress is being made in attaining the standards in each nonattainment area.

3.1.4.3 Summary of State Air Quality for the Criteria Air Pollutants

Northern Border

Montana is located in the EPA's Region 8. The Montana Department of Environmental Quality (MDEQ) is the state agency responsible for air quality management matters (e.g., permitting). Montana's Ambient Air Quality Standards are shown in Table 3-5. All the counties located in Montana within the ROI are currently in attainment (EPA 2001a).

North Dakota is also located in the EPA's Region 8. The North Dakota Department of Health (NDDH) is the state agency in charge of permitting, compliance, impact analysis, and monitoring. Table 3-5 shows North Dakota's Ambient Air Quality Standards. The ROI within North Dakota is currently in attainment for all criteria pollutants (EPA 2001b).

Minnesota is located in the EPA's Region 5. The Minnesota Pollution Control Agency (MPCA) is the state agency in charge of monitoring environmental quality and enforcing environmental regulations. Table 3-5 shows Minnesota's Ambient Air Quality Standards. The ROI within Minnesota is currently in attainment for all criteria pollutants (EPA 2001b).

Wisconsin is also located in the EPA's Region 5. Wisconsin's Department of Natural Resources (WDNR) is responsible for implementing the laws of the state and, where applicable, the laws of the Federal government that protect and enhance the natural resources of the state. Table 3-5 shows Wisconsin's Ambient Air Quality Standards. The ROI within Wisconsin is currently in attainment for all criteria pollutants (EPA 2001b).

Table 3-5. State Ambient Air Quality Standards for States along the Northern Border

POLLUTANT	Standard Value	Standard Type	Standard Value	Standard Type	Standard Value	Standard Type	Standard Value	Standard Type
	Montana		North Dakota		Minnesota		Wisconsin	
Carbon Monoxide (CO)								
8-hour average	9ppm	P and S	9ppm	P and S	9ppm	P and S	9ppm	P and S
1-hour average	23ppm	P and S	35ppm	P and S	30ppm	P and S	35ppm	P and S
Nitrogen Dioxide (NO_2)								
Annual arithmetic mean	0.05ppm	P and S	0.053ppm	P and S	0.05ppm	P and S	0.05ppm	P and S
Ozone (O_3)								
1-hour average*	0.10ppm	P and S	0.12ppm	P and S	---		0.12ppm	P and S
8-hour average*	---	---	---	---	0.08ppm	P and S	---	---
Lead (Pb)								
Quarterly average	1.5μg/m³	P and S	1.5μg/m³	P and S	1.5μg/m³	P and S	1.5μg/m³	P and S
Particulate<10 micrometers (PM-10)								
Annual arithmetic mean	50μg/m³	P and S	50μg/m³	P and S	50μg/m³	P and S	50μg/m³	P and S
24-hour average	150μg/m³	P and S	150μg/m³	P and S	150μg/m³	P and S	150μg/m³	P and S
Particulate<2.5 micrometers (PM-2.5)								
Annual arithmetic mean	---	---	---	---	15μg/m³	P and S	---	---
24-hour Average	---	---	---	---	65μg/m³	P and S	---	---
Sulfur Dioxide (SO_2)								
Annual arithmetic mean	0.02ppm	P and S	0.023ppm	P and S	0.03ppm	P and S	0.03ppm	P and S
24-hour average	0.10ppm	P and S	0.099ppm	P and S	0.14ppm	P and S	0.14ppm	P and S
1-hour average	0.50ppm	P and S	0.273ppm	P and S	0.50ppm	S	0.50ppm	S

Source: MDEQ 2001, NDDH 2001, WDNR 2001, and MPCA 2001.

Legend: ppm = parts per million P=primary
mg/m³ = milligrams per cubic meter of air S=secondary
μg/m³ = micrograms per cubic meter of air --- = no state standards are set NAAQS are used

*The ozone 1-hour standard applies only to areas that were designated nonattainment when the ozone 8-hour standard was adopted in July 1997.

**Parenthetical value is an approximate equivalent concentration.

Table 3-6. State Ambient Air Quality Standards for States Along the Southern Border

Pollutant	Standard Value	Standard Type
	New Mexico	
Carbon Monoxide (CO)		
8-hour average	8.7ppm	P and S
1-hour average	13.1ppm	P and S
Nitrogen Dioxide (NO_2)		
Annual arithmetic mean	0.05ppm	P and S
Sulfur Dioxide (SO_2)		
Annual arithmetic mean	0.02ppm	P and S
24-hour average	0.10ppm	P and S
1-hour average	---	---

Source: NMED 2001 and TNRCC 2001.
Legend: ppm = parts per million P=primary
S=secondary
--- = no state standards are set NAAQS are used

Southern Border

New Mexico is located in the EPA's Region 6. The Air Quality Bureau (AQB) under supervision of the New Mexico Environmental Department (NMED) is the state agency in charge of monitoring and enforcing air quality regulations. Table 3-6 shows New Mexico's Ambient Air Quality Standards. Dona Ana County in New Mexico is currently in violation of the NAAQS for ozone and PM-10; the rest of the ROI within Mexico is currently in attainment (EPA 2001b). As can be seen from Table 3-6, New Mexico only has state standards for carbon monoxide, nitrogen dioxide, and sulfur dioxide.

Texas is also located in the EPA's Region 6. The Texas Natural Resources Conservation Commission (TNRCC) is the state agency responsible for permitting, remediation, and registration. Texas does not have state ambient air quality standards. Currently, the NAAQS (See Table 3-4) are followed. El Paso is currently in violation of the NAAQS for ozone, carbon minoxide and PM-10; the rest of the ROI within Mexico is currently in attainment (EPA 2001b).

3.1.5 Noise

Noise is Federally regulated by the Noise Control Act of 1972 (NCA). Although the NCA tasks the EPA to prepare guidelines for acceptable ambient noise levels, it only charges those Federal agencies that operate noise-producing facilities or equipment to implement noise standards.

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

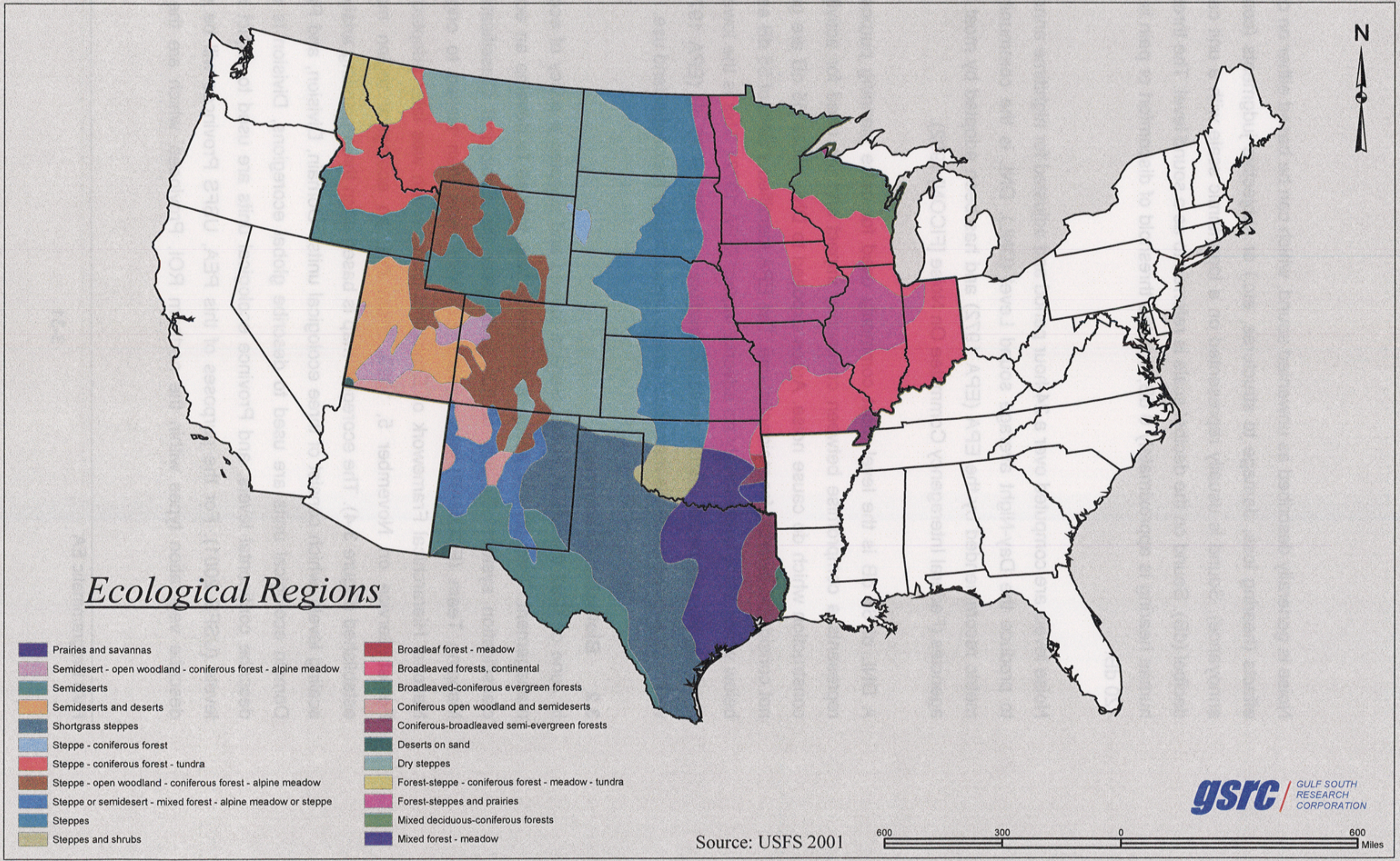
Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the Day-Night average sound Level (DNL). DNL is the community noise metric recommended by the EPA (EPA 1972) and has been adopted by most Federal agencies (Federal Interagency Committee On Noise [FICON] 1992).

A DNL of 65 dB is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. The EPA identified a DNL of 55 dB as a level below which there is effectively no adverse impact (EPA 1972). This is the lowest level at which adverse health effects could be credible in a DNL of 75 dB (EPA 1972). The very high annoyance levels make such areas unsuitable for residential land use.

3.2 Biological Resources

In June of 1992 the USDA Forest Service formed and adopted a policy of ecosystem management. Through this policy, a task force was formed to develop an ecological classification system. By July of this same year the Ecological Classification and Mapping Team (ECOMAP) was formed. ECOMAP was then tasked to originate a National Hierarchical Framework of Ecological Units, which was later adopted by the Forest Service on November 5, 1993. From this, an ecological region map was established (Figure 3-4). The ecoregion map is based upon three planning analysis and scaling levels, which consist of three ecological units: Domain, Division, and Province. Domain ecological units are used to describe global ecoregions, Division is used to describe continental levels, and Province ecological units are used to depict regional levels (USFS 2001). For the purposes of this PEA, USFS Provinces will be used to describe vegetation types within the northern ROI. Provinces, which are the lowest

Figure 3-4 Ecological Regions Within the INS Central Region



hierarchical level at the ecoregion scale are used in this PEA. The common and scientific names of plants and animals used in this section are given in Appendix A.

3.2.1 Vegetation Communities

3.2.1.1 Northern Border

For the northern ROI there are several domain, division, and province ecological units (Table 3-7).

Table 3-7. Ecological Regions in the Northern ROI.

Domain	Division	Province
Humid Temperate Domain	Warm Continental Division	Laurentian Mixed Forest Province
	Hot Continental Division	Eastern Broadleaf Forest (Continental) Province
	Prairie Division	Prairie Parkland (Temperate) Province
Dry Domain	Temperate Steppe Division	Great Plains-Palouse Dry Steppe Province
		Great Plains Steppe Province
		Northern Rocky Mountains – Steppe – Coniferous – Forest – Alpine Meadow Province

Source: USFS 1994.

The Northern Rocky Mountain Forest–Steppe—Coniferous Forest—Alpine Meadow Province stretches into the northwestern third of Montana. This Province consists of mountainous rugged terrain with flat to nearly flat valleys and is described as being predominantly a mixed evergreen/deciduous forest. The two major forest types within this area are Douglas fir and cedar-hemlock-Douglas fir. Other common tree species that can be found throughout this province are western white pine, grand fir, western larch and western ponderosa.

The Great Plains-Palouse Dry Steppe Province, which is found throughout the northern two thirds of Montana and in the northwestern corner of North Dakota, is distinguished by its rolling plains and isolated mountainous outcroppings. Shortgrass prairies consisting of species such as sagebrush and rabbitbrush characterize vegetation within the province. Other common species in this area are grama grass, wheatgrass, buffalo grass, blazingstar, white prickly poppy, and the invasive Russian thistle.

The Great Plains Steppe Province is known for its flat and rolling plains. This province extends through the middle of North Dakota. This area is a combination of shortgrass prairie and tallgrass prairie parkland. The common shortgrass prairie species found here are blue grama, hairy grama, and buffalo grass. Tallgrass prairie species include little bluestem, neddlegrass, and threadgrass. Other common species, which can be found within the region, are the slender wheatgrass, galleta, and the purple three-awn. Woody vegetation for the most part is void within this region except along floodplains where cottonwood trees are the dominant species. Common forbs in the province are broomweed, sunflowers, and ragweed.

The northeastern portion of North Dakota and the northwestern one-third of Minnesota fall within the Prairie Parkland (Temperate) Province. The Prairie Parkland Province is generally comprised of alternating prairie and deciduous forest ranging from rolling plains to steep bluffs with a number of valleys. The vegetation in this area is known as forest-steppe. Dominant grasses in the province are bluestem prairie, little bluestem, Indian grass, and switchgrass. The upland forests that are located throughout the eastern and western portion of the province are comprised of mainly oak and hickory with scattered cottonwoods and American elm.

The middle one-third of Minnesota lies within the Eastern Broadleaf Forest (Continental) Province. The terrain is depicted as being rolling to nearly flat. Broadleaf deciduous forests that are made up of oak and hickory dominate this province. Common trees in the province are white oak, red oak, black oak, bitternut hickory, sugar maple, and American basswood.

The Laurentian Mixed Forest Province covers the eastern one-third of Minnesota and along the northern and eastern borders of Wisconsin. The land-surface is typically described as consisting of lakes, morainic hills, wetlands, and outwash plains. The vegetation for the Laurentian Mixed Forest is often depicted as being a mix of boreal and deciduous forest. The common woody vegetation found within the province are deciduous species such as yellow birch, sugar maple, American beech, and coniferous species like eastern red cedar and eastern hemlock.

3.2.1.2 Southern Border

This information regarding vegetation for the southern border of the Central Region is taken from the INS/JTF-6 Environmental Baseline Study for the Texas and New Mexico Land Border (U.S. Army 1994).

A total of five biotic provinces occur in New Mexico. However, the two provinces within the ROI are the Apachian and the Chihuahuan Provinces (Dice 1943).

The Apachian Biotic Province covers the grassy high plains and mountains of southwestern New Mexico and consists of plants adapted to semiarid conditions. The Chihuahuan Biotic Province covers the desert region of south-central New Mexico and extends into western Texas. Amidst these provinces are several different vegetation communities (i.e. forest, woodland-savanna, grassland, scrubland, and riparian). Some of the common woody species are Douglas fir, white fir, blue spruce, pinyons, junipers, and oaks. The woodland-savanna provides a transition zone that is covered in pinyon pines and junipers. Other common vegetation includes the Gambel oak, Arizona white oak, and pointleaf manzanita, Shrubs and grasses that typically grow in these provinces are blue grama, tobosa grass, curly cup gumweed, coneflowers, Rocky Mountain zinnia, silverleaf oak, buckbrush, shinoak, sand sagebrush, low yucca, four-wing saltbush, and Texas croton. Along the drainages around the mesas are burrobrush, Apache plume, and brickellia.

Within Texas there are seven biotic provinces, but only three are found in the ROI: The Chihuahuan, Balconian, and the Tamaulipan Biotic Provinces (Dice 1943; Blair 1950, 52). The Chihuahuan Province extends from El Paso County to Brewster County and is characterized as arid with vegetation that is widely characteristic of the southwestern mountains and deserts. Dominant vegetation within this province includes creosotebush, tobosa, gray oak, pinyon pine, yucca, mesquite, saltcedar, and sandsage.

The Balconian Province covers an area from Brewster County to Uvalde County Texas. Common vegetation for this area includes Texas sage, creosotebush, mesquite, live oak, junipers, gray oak, tobosa, and black grama.

The Tamaulipan Province encompasses the entire Southern Gulf Coastal Plains and is characterized as semiarid with a dense growth of shrubs and small trees (Blair 1950). This province ranges from Uvalde County to Cameron County, Texas. The vegetation in this area is mainly comprised of Gulf prairie/marsh and South Texas Plains species. Some of the more typical plants within the gulf prairie/marsh are cattail, water-pennywort, duckweed, common reed, flat sedge, and sea rocket. The South Texas Plains area is more typical of woody and shrubby vegetation such as Texas prickly pear, leatherstem, whitebrush, yaupon, mesquite, live oak, and lotebush; however, other plants such as bullnettle, dayflower, field ragweed, and pink pappusgrass are also common.

3.2.2 Wildlife

The Fish and Wildlife Coordination Act of 1934, as amended in 1946, 1958, 1978, 1995 ensures that wildlife conservation receives equal consideration and is coordinated with other features of water resource development programs. Whenever reclamation or modification proposes to alter or modify any body of water for any purpose, an agency must first consult and coordinate its actions and projects with the USFWS and the affected state fish and game agency(ies). This consultation and coordination will address ways to conserve wildlife resources by preventing loss of and damage to such resources, as well as to further develop and improve these resources.

The Migratory Bird Treaty Act of 1918, as amended in 1936, 1960, 1968, 1969, 1974, 1978, 1986 and 1989 implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful. In addition to the above-mentioned laws, each state also has its own unique set of state wildlife laws.

The following sections summarize wildlife that could potentially occur in the ROI. The following sections do not provide site-specific information; however, they provide an overview of wildlife species found in each border state.

3.2.2.1 Northern Border

Montana

Montana is located in the USFWS Region 6 (Mountain Prairie Region). The ROI within Montana is located in the Great Plains-Palouse Dry Steppe Province and the Northern Rocky Mountains Forest –Steppe-Coniferous-Forest-Alpine Meadow Province (USFS, 2001). Common wildlife found within the Great Plains-Palouse Dry Steppe Province include pronghorn, mule deer, white-tailed deer, whitetail jackrabbit, blacktail jackrabbit, desert cottontail, prairie dogs, coyote, thirteen-lined ground squirrels, badgers, sage grouse, sharp-tailed grouse, horned lark, lark bunting, and western meadowlark.

Common wildlife of the Northern Rocky Mountains Forest–Steppe-Coniferous-Forest-Alpine Meadow Province includes black bears, deer, elk, mountain goats, mountain lions, bobcats, Columbia ground squirrels, flying squirrels, redtail chipmunks, and bushytail woodrats. Common birds include various hawks, jays, chestnut-backed chickadees, and the red-breasted nuthatch. Blue and ruffed grouse are the most common game birds.

Montana has the largest grizzly bear population south of Canada, the largest herd of Rock Mountain bighorn sheep, the largest migratory elk herd in the nation, and the largest breeding population of trumpeter swans in the lower 48 states. Currently, there are approximately 114 species of mammals, 254 birds, 89 fish, 13 amphibians, and 17 reptiles within the state.

North Dakota

North Dakota is also located in the USFWS Region 6 (Mountain Prairie Region). The ROI within North Dakota includes the Prairie Parkland (Temperate) Province, the Great Plains-Palouse Dry Steepe Province, and the Great Plains Steppe Province. North Dakota has a larger concentration of reproducing ducks than any other state. There are approximately 80 species of mammals, 354 birds, 11 amphibians, and 15 reptiles in the state of North Dakota.

Common wildlife of the Prairie Parkland (Temperate) Province includes mink, river otters, thirteen-lined ground squirrels, blacktail prairie dogs, belted kingfishers, bank swallows, spotted sandpipers, and green-backed herons, horned larks, eastern meadowlarks, and mourning doves.

The Great Plains-Palouse Dry Steepe Province was previously discussed in the Montana section.

Common wildlife found within the Great Plains Steppe Province includes pronghorn, coyotes, jackrabbits, cottontail rabbits, ground squirrels, prairie dogs, pocket gophers, badgers, mourning doves, sharp-tailed grouse, and bobwhite quail.

Minnesota

Minnesota is located in the USFWS Region 3 (Great Lakes-Big Rivers Region). The ROI within Minnesota is located in three provinces including the Laurentian Mixed Power Forest Province, the Eastern Broadleaf Forest (Continental) Province, and the Prairie Parkland (Temperate) Province.

Common wildlife found within the Laurentian Mixed Power Forest Province includes the shorttail weasel, snowshoe hare, black bear, striped skunk, marmot, chipmunk, and jumping mice, badgers, striped ground squirrels, beavers, and muskrats. Common birds are the ptarmigan, white-throated sparrow, northern junco, and yellow-bellied sapsucker.

The Eastern Broadleaf Forest (Continental) Province includes wildlife such as gray squirrels, fox squirrels, and eastern chipmunks. Common birds include blue jays, scarlet and summer tanagers, rose-breasted grosbeaks, ovenbirds, wild turkeys, and cerulean warblers.

Common wildlife in the Prairie Parkland (Temperate) Province was previously discussed in the North Dakota Section.

There are approximately 80 species of mammals, 10 amphibians, 29 reptiles, and 395 birds that can be found in Minnesota. Minnesota also has the largest wolf population in the lower 48 states (Minnesota Department of Natural Resources, 2001).

Wisconsin

Wisconsin is also located in the USFWS Region 3 (Great Lakes-Big Rivers Region). The study area within Wisconsin includes the Laurentian Mixed Power Forest Province that was previously discussed in the Minnesota section.

3.2.2.2 Southern Border

New Mexico

New Mexico is located in the USFWS Region 2 (Southwest Region). The ROI within New Mexico is located within the Chihuahuan Semi-Desert Province. Common wildlife includes pronghorn antelope, mule deer, white-tailed deer, collared peccary, javelina, blacktail jackrabbit, desert cottontail, kangaroo rat, wood rat, coyote, bobcat, black-throated sparrow, greater roadrunner, curve-billed thrasher, Chihuahuan raven, scaled quail, Gambel's quail, bobwhite, golden eagle, great horned owl, red-tailed hawk, and ferruginous hawk.

New Mexico ranks second in the number of different mammals found within a state with more than 150 species. Over 90 species of fish and 480 birds can be found in New Mexico.

Texas

Texas is also located in the USFWS Region 2 (Southwest Region). The ROI within Texas is located within two provinces including the Southwest Plateau and Plains Dry Steppe and Shrub Province, and the Chihuahuan Semi-Desert Province.

Common wildlife of the Southwest Plateau and Plains Dry Steppe and Shrub Province includes Mexican ground squirrels, fox squirrels, gray fox, whitetail deer, armadillos, ringtails, raccoons, Mexican freetail bats, wild turkey, mourning dove, scaled quail, and bobwhite quail.

The Chihuahuan Semi-Desert Province was previously discussed in the New Mexico section.

Texas has a higher diversity of birds, hummingbirds, and butterflies than any other state. There are approximately 293 species of mammals, 620 birds, 214 reptiles, and 71 amphibians that can be found in Texas.

3.2.3 Threatened and Endangered Species

The ESA [16 U.S.C. 1532 et. seq.] of 1973, as amended, was enacted to provide a program for the preservation of endangered and threatened species and to provide protection for the ecosystems upon which these species depend for their survival. All Federal agencies are required to implement protection programs for designated species and to use their authorities to further the purposes of the act. Responsibility for the identification of a threatened or endangered species and development of any potential recovery plans lies with the Secretary of the Interior and the Secretary of Commerce.

The USFWS and the National Marine Fisheries Service (NMFS) are the primary agencies responsible for implementing the ESA. The USFWS is responsible for birds, terrestrial, and freshwater species, while the NMFS is responsible for non-bird marine species. The USFWS's responsibilities under the ESA include: (1) the identification of threatened and endangered species; (2) the identification of critical habitats for listed species; (3) implementation of research on, and recovery efforts for, these species; and (4) consultation with other Federal agencies concerning measures to avoid harm to listed species.

An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those that have been formally submitted to Congress for official listing as threatened or endangered. Species may be considered endangered or threatened when any of the five following criteria occurs: (1) the current/imminent destruction, modification, or curtailment of their habitat or range; (2) overuse of the species for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; and (5) other natural or human-induced factors affect continued existence.

In addition, the USFWS has identified species that are candidates for listing as a result of identified threats to their continued existence. The candidate designation includes those species for which the USFWS has sufficient information on hand to support proposals to list as endangered or threatened under the ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.

The ESA also calls for the conservation of what is termed critical habitat - the areas of land, water, and air space that an endangered species needs for survival. Critical habitat also includes such things as food and water, breeding sites, cover or shelter, and sufficient habitat area to provide for normal population growth and behavior. One of the primary threats to many species is the destruction or modification of essential habitat by uncontrolled land and water development.

3.2.3.1 Federal

Each of the states and counties covered in this document have Federally endangered, threatened, proposed threatened, and/or candidate species; however, these lists are continuously updated. Abbreviated EAs or other appropriate NEPA documentation will be developed for each of the proposed RVS sites. Prior to writing each document, site-specific information on protected species and current species lists would be obtained from local USFWS Regional Offices and state agencies through informal consultation letters. In addition, field surveys would be performed, if needed, and the NEPA documentation would further discuss protected species that may be affected by the proposed project. USFWS Regions responsible for those states in the ROI can be found in Section 3.5.2.

3.2.3.2 Critical Habitat

Any Federally-designated critical habitat found in any of the states and counties covered in this document that fall within the ROI will be fully disclosed and addressed in separate, more site-specific abbreviated EA for each proposed RVS site. Information on designated or proposed critical habitat can be obtained from the local USFWS Regional Office or in the Federal Register (http://www.access.gpo.gov/su_docs/aces/aces140.html).

3.2.3.3 State

State wildlife agencies that deal with the protection of threatened and endangered species will be able to provide a current list of state protected species or state species of concern. These lists include species whose occurrence in the state is or may be in jeopardy, limited or unique habitats, or population declines. These species are not necessarily the same as those protected by the Federal government under the ESA. Information pertaining to these species would be collected and included subsequent NEPA documentation written for each proposed RVS site. The following is a list of the appropriate state wildlife agency to contact for information pertaining to state protected species:

- Montana Fish, Wildlife, and Parks
- North Dakota Game and Fish Department
- Minnesota Department of Natural Resources, Division of Ecological Services
- Wisconsin Department of Natural Resources, Bureau of Endangered Resources
- New Mexico Game and Fish Department
- Texas Parks and Wildlife Department

3.2.4 Unique and Sensitive Areas

3.2.4.1 Northern Border

The northern border of the U.S. and the ROI are an ecological melting pot, where habitats and species from the Rocky Mountains, Great Plains, and Great Lakes exist. Ongoing efforts by many government agencies, as well as private entities, have set aside these areas for preservation. These areas are intended for use by the public in hopes of better understanding the myriad of natural systems exhibited in their natural state. Many unique and sensitive areas lie within the ROI, some of these areas include national forests and parks, state forests, state wildlife management areas, National Wildlife Refuges (NWR), Indian reservations, and national points of interest. Some of the unique and sensitive areas along the northern border are shown in Table 3-8. It should also be noted that this list only represents the obviously unique and sensitive areas and is not an all-inclusive list of unique and sensitive areas within the region.

3.2.4.2 Southern Border

The remaining states within the southern ROI are New Mexico and Texas. The southern ROI is an ecological crossroads where habitats and species from various mountain ranges, Southern Plains, and the Southern Gulf Coastal Plains meet. A partial list of potential unique and sensitive areas on the southern border are shown in Table 3-9. It should also be noted that this list only represents the obviously unique and sensitive areas and is not an all-inclusive list of unique and sensitive areas within the region.

Table 3-8. Northern Border Unique and Sensitive Areas

Unique and Sensitive Area	Acreage	Counties
Montana		
Glacier National Park	1,000,000	Glacier
Blackfeet Indian Reservation	1,500,000	Blackfeet tribe, Glacier
Rocky Boys Indian Reservation	107,000	Chippewa-Cree tribe, Hill
Belknap Indian Reservation, Assiniboine and Gros Ventre tribes	> 60,000	Blaine
Milk River Management Area	1,343	Phillips
Fort Peck Indian Reservation	281,600	Sioux and Assiniboine tribes, Valley, Daniels, Roosevelt, and Sheridan
Medicine Lake National Refuge	31,457	Sheridan
North Dakota		
Lostwood National Wildlife Refuge	26,900	Burke
Des Lacs NWR	19,500	Burke
J. Clark Salyer NWR	58,700	Bottineau
Lake Metigoshe State Park	1,551	Bottineau
Turtle Mountain Indian Reservation	600,300	Chippewa tribe, Rolette
International Peace Gardens	2,300	Rollette
Minnesota		
Hayes Lake State Park	2,950	Roseau
Zippel Bay State Park	3,000	Lake of the Woods
Northwest Angle State Forest	14,399	Lake of the Woods
Beltrami Island State Forest	506,873	Lake of the Woods
Red Lake Indian Reservation	837,736	Chippewa tribe, Lake of the Woods
Pine Island State Forest	641,117	Koochiching
Smokey Bear State Forest,	10,900	Koochiching
Koochiching State Forest	344,300	Koochiching
Kabetogama State Forest	159,558	Saint Louis
Boundary Waters Canoe Area	> 1,000,000	Saint Louis, Lake, and Cook
Grand Portage Indian Reservation	47,000	Chippewa tribe, Cook
Grand Portage National Monument	710	Cook
Grand Portage State Park	300	Cook
Wisconsin		
Brule State Park	40,000	Douglas
Pattison State Park	1,476	Douglas
Amnicon State Park	825	Douglas
Douglas County Wildlife Area	3,991	Douglas
Red Cliff Indian Reservation	8,960	Chippewa tribe, Bayfield
Big Sioux River Fishery Area	487	Bayfield
Fish Creek Sloughs Fishery Area	250	Bayfield
Copper Falls State Park	2,676	Ashland
Bad River Indian Reservation	124,234	Chippewa tribe, Ashland
White River Wildlife Area	960	Ashland
Apostle Island National Lakeshore	69,371	Bayfield and Ashland
Chequamegon National Forest	858,400	Bayfield and Ashland

Table 3-9. Southern Border Unique and Sensitive Areas

Unique and Sensitive Area	Acreage	Counties
New Mexico		
Coronado National Forest	> 1,500,000	Hidalgo
San Andres National Wildlife Refuge	57,215	Dona Ana
Fort Bliss Military Reservation	1,800,000	Dona Ana County, NM and El Paso County, TX
Pancho Villa State Park	60	Luna
Texas		
Guadalupe Mountains National Park	86,416	Hudspeth
Big Bend National Park	801,000	Brewster
Big Bend Ranch State Park	280,280	Presidio and Brewster
Seminole Canyon State Historical Park	2,172	Val Verde
Amistad National Recreation Area	67,000	Val Verde
Lake Casa Blanca International State Park	2,021	Webb
Falcon State Park	572	Zapata
Bentsen-Rio Grande Valley State Park	588	Hidalgo
Sierra Diablo Wildlife Management Area	11, 625	Hudspeth
Black Gap Wildlife Management Area	107,000	Brewster
Chaparral Wildlife Management Area	15,200	Dimmitt
Santa Ana National Wildlife Refuge	2,080	Hidalgo
Sabal Palm Audubon Sanctuary	527	Cameron
Boca Chica State Park	1,055	Cameron

3.3 Socioeconomic Resources

3.3.1 Land Use

Land use, in general, is indicative of the land ownership. Throughout the ROI many variations of use are visible. These uses are typically cropland, forestland, rangeland, pastureland, Federal and State lands (i.e. national parks, wildlife management areas, and wildlife refuges). Federal and State lands are under the direction of agencies such as the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), State Parks and Recreation Departments, State Wildlife and Fisheries Agencies, and State Departments of Natural Resources. A brief description of the general land use patterns will be given in the following paragraphs. Table 3-10 displays acreages for land use by state in the ROI.

Table 3-10. Major Land Use by State (thousands of acres).

State	Federal	Developed	Cropland	Pastureland	Rangeland	Forestland	Total land area
Montana	27,089	1,032	15,170	3,442	36,750	5,430	94,110
North Dakota	1,785	991	25,003	1,128	10,689	454	45,250
Minnesota	3,336	2,185	27,413	3,434	0	16,248	54,009
Wisconsin	1,845	2,417	10,613	2,994	0	14,448	35,920
New Mexico	26,448	1,152	1,875	230	39,989	5,466	77,823
Texas	2,909	8,567	26,937	15,914	95,744	10,816	171,051

Source. NRCS Summary Report for National Resources Inventory, 2000.
** Note. "Other rural lands, Conservation Reserve Program (CRP) Lands, and Water area" have been omitted from the table.

3.3.1.1 Northern Border

Land use in Montana consists mostly of Federal land and croplands. The northwestern section of the state, the Rocky Mountains, is in Federal ownership and is comprised of parks and forests such as Glacier National Park and Flathead National Forest. The remainder of Montana is dominated by cropland with a smattering of range and forestlands located in the north-central part of the state.

The dominating land use across the entire northern border of North Dakota and into northwestern Minnesota is cropland. Forest and Federal lands are the prominent land use for the remainder of the Minnesota border as well as across the northern border of Wisconsin. Some of these Federal lands along the northern Minnesota and Wisconsin borders are Voyageurs National Park, The Boundary Waters Canoe Area, Superior National Forest, Apostle Island National Lakeshore, and the Chequamegon National Forest. Along with Federal lands in the Minnesota/Wisconsin area there are a small number of Indian Reservations. For instance, the Bad River Indian Reservation which is located in northern Ashland County, Wisconsin and the Red Lake Indian Reservation located in Lake of the Woods County, Minnesota.

3.3.1.2 Southern Border

The southern border of New Mexico is classified as being either in Federal lands or rangeland. Southwestern and southeastern New Mexico is primarily rangeland while central New Mexico is mostly Federal land. These Federal lands are typically managed by the BLM and are generally wilderness areas. The three common land uses along the Texas/Mexico border include cropland, rangeland, and parks. The majority of the lands are croplands, which are located primarily within the Lower Rio Grande Valley (Zapata, Starr, and Hidalgo Counties). The rest of the border is dominated by rangeland with the exception of Big Bend National Park (BBNP) and Big Bend Ranch State Park (BBRSP). The National Park Service operates BBNP, while BBRSP, is operated by Texas Parks and Wildlife Department.

3.3.2 Demographics and Housing

3.3.2.1 Demographics

<u>Northern Border Demographics</u>

The northern border ROI consists of a 30-county area across the border in Montana, North Dakota, Minnesota, and Wisconsin. The population and racial mixes of the different counties are presented in Table 3-11. Population in each of the counties ranges from 200,528 in St. Louis County, Minnesota to 2,017 in Daniels County, Montana. The racial mix of the area is dominated by Caucasians in almost all counties within the ROI ranging from 99% in Burke County in North Dakota to 35% in Rolette County, North Dakota. The only exceptions are Glacier County, Montana and Rolette County, North Dakota, which are predominantly Native Americans (62 and 73% respectively). This high Native American population is mostly due to the Turtle Mountain Indian Reservation located within Rolette County, North Dakota and the Black Feet Indian Reservation within Glacier County, Montana. Only a small percentage (10 to <1%) of the population within the counties claims to be of Hispanic Origin. Almost half of the counties within the northern ROI experienced a negative population growth over the last 10 years ranging from –25% in Burke County, North Dakota to –6% in Hill County Montana. Six of the 30 counties experienced positive population growth with the greatest being Cook County, Minnesota (34%) and the least being St. Louis County, Minnesota (1%). Population density is relatively low across the northern ROI ranging from 36.8 persons per square mile in Carlton County, Minnesota to 0.9 persons per square mile in Phillips County, Montana.

Table 3-11. Population and Demographics along the Northern Border ROI

Geographic Region	Total	Population per Square Mile	Percent Caucasian	Percent African American	Percent American Indian	Percent Asian	Percent Hawaiian or Pacific Islander	Percent Some other race	Percent Two or more races	Percent Hispanic (of any race)	Percent Change 1990-2000
Montana	902,195	6.2	91	<1	6	<1	<1	<1	2	2	13
Glacier County	13,247	4.4	35	<1	62	<1	<1	<1	2	1	9
Toole County	5,267	2.8	94	<1	3	<1	<1	<1	2	1	4
Liberty County	2,158	1.5	99	0	<1	<1	0	<1	<1	<1	-6
Hill County	16,673	5.8	80	<1	17	3	<1	3	18	10	-6
Blaine County	7,009	1.7	53	<1	45	<1	<1	<1	2	1	4
Phillips County	4,601	0.9	89	<1	8	<1	<1	<1	2	1	-11
Valley County	7,675	1.6	88	<1	9	<1	<1	<1	2	<1	-7
Daniels County	2,017	1.4	96	0	1	<1	<1	<1	2	2	-11
Sheridan County	4,105	2.4	97	<1	1	<1	<1	<1	1	1	-13
North Dakota	642,200	9.3	92	<1	5	<1	<1	<1	1	1	<1
Divide County	2,283	1.8	99	0	<1	<1	0	<1	<1	<1	-21
Burke County	2,242	2	99	<1	<1	<1	0	<1	<1	<1	-25
Renville County	2,610	3	97	<1	<1	<1	0	<1	<1	<1	-17
Bottineau County	7,149	4.3	97	<1	1	<1	<1	<1	<1	<1	-11
Rolette County	13,674	15.2	25	<1	73	<1	0	<1	2	<1	7
Towner County	2,876	2.8	97	<1	2	<1	0	<1	<1	<1	-21
Cavalier County	4,831	3.2	98	<1	<1	<1	0	<1	1	<1	-20
Pembina County	8,585	7.7	95	<1	1	<1	0	1	1	3	-7.1
Minnesota	4,919,479	61.8	89	3	1	3	<1	1	2	3	12
Kittson County	5,285	4.8	98	<1	<1	<1	0	<1	<1	1	-8
Roseau County	16,338	9.8	96	<1	1	2	<1	<1	<1	<1	9
Lake of the Woods County	4,522	3.5	97	<1	1	<1	0	<1	1	<1	11

Table 3-11. (Cont.'d)

Geographic Region	Total	Population per Square Mile	Percent Caucasian	Percent African American	Percent American Indian	Percent Asian	Percent Hawaiian or Pacific Islander	Percent Some other race	Percent Two or more races	Percent Hispanic (of any race)	Percent Change 1990-2000
Minnesota (cont'd)	4,919,479	61.8	89	3	1	3	<1	1	2	3	12
Koochiching County	14,355	4.6	96	<1	2	<1	<1	<1	1	<1	-12
Carlton County	31,671	36.8	92	<1	5	<1	<1	<1	2	<1	8
St. Louis County	200,528	32.2	95	<1	2	<1	<1	<1	1	<1	1
Lake County	11,058	5.3	98	<1	<1	<1	<1	<1	<1	<1	6
Cook County	5,168	3.6	89	<1	8	<1	<1	<1	2	<1	34
Wisconsin	5,363,675	98.8	89	6	<1	2	<1	2	1	4	10
Douglas County	43,287	33.1	95	<1	2	<1	<1	<1	1	<1	4
Bayfield County	15,013	10.2	88	<1	9	<1	<1	<1	1	<1	7
Ashland County	16,866	16.2	87	<1	10	<1	<1	<1	2	1	3
Iron County	6,861	9.1	98	<1	<1	<1	<1	<1	<1	<1	12

Source: U.S. Census Bureau 2001

Table 3-12. Population and Demographics of the Southern ROI

Geographic Region	Total	Population per Square Mile	Caucasian (Percent)	African American (Percent)	American Indian (Percent)	Asian (Percent)	Hawaiian or Pacific Islander (Percent)	Some other race (Percent)	Two or more races (Percent)	Percent Hispanic (of any race)	Population Change 1990-2000 (Percent)
New Mexico	**1,819,046**	**15**	**66.75**	**1.89**	**9.54**	**1.06**	**0.08**	**17.04**	**3.65**	**42.08**	**20.10**
Hidalgo County	5,932	1.7	83.78	0.40	0.78	0.32	0.00	11.85	2.87	56.04	-0.40
Luna County	25,016	8.4	74.30	0.94	1.11	0.34	0.00	20.23	3.08	57.70	38.10
Dona Ana County	174,682	45.9	67.82	1.56	1.48	0.76	0.07	24.74	3.58	63.35	28.90
Texas	20,851,820	79.6	70.97	11.53	0.57	2.70	0.07	11.69	2.47	31.99	22.80
El Paso County	679,622	670.8	73.95	3.06	0.82	0.98	0.10	17.91	3.19	78.23	14.90
Hudspeth County	3,344	0.7	87.23	0.33	1.41	0.18	0.00	8.76	2.09	75.03	14.70
Jeff Davis County	2,207	1	90.53	0.91	0.32	0.09	0.00	5.17	2.99	35.48	13.40
Presidio County	7,304	1.9	84.95	0.27	0.27	0.08	0.01	13.47	0.93	84.36	10.00
Brewster County	8,866	1.4	81.09	1.22	0.85	0.37	0.06	13.44	2.98	43.62	2.50
Terrell County	1,081	0.5	88.34	0.00	1.67	0.65	0.00	8.33	1.02	48.57	-23.30
Val Verde County	44,856	14.1	76.36	1.54	0.68	0.55	0.05	18.22	2.60	75.46	15.80
Kinney County	3,379	2.5	75.82	1.69	0.33	0.12	0.00	18.61	3.43	50.52	8.30
Maverick County	47,297	36.9	70.89	0.31	1.34	0.39	0.04	24.08	2.95	95.01	30.00
Webb County	193,117	57.5	82.16	0.37	0.47	0.43	0.02	14.00	2.54	94.28	44.90
Zapata County	12,182	12.2	84.07	0.41	0.32	0.19	0.04	12.64	2.33	84.78	31.30
Starr County	53,597	43.8	87.92	0.15	0.25	0.28	0.04	9.91	1.46	97.54	32.30
Hidalgo County	569,463	362.8	77.71	0.49	0.42	0.59	0.02	18.64	2.12	88.35	48.50
Cameron County	335,227	370.1	80.29	0.48	0.44	0.48	0.03	15.98	2.30	84.34	28.90

Source: U.S.Census Bureau 2001

Southern Border Population and Demographics

The southern border ROI of the proposed actions consists of a 17 county area across the border in New Mexico and Texas. The population and racial mixes of the different counties are presented in Table 3-12. Population in each of the counties ranges from 679,622 in El Paso County, Texas to 1,081 in Terrell County, Texas. The racial mix of the area is predominated by Caucasians in almost all counties within the southern ROI ranging from 90.53% in Jeff Davis County, Texas to 67.82% in Dona Ana County, New Mexico. A large percentage (97.54 to 34.58%) of the population within the counties claims to be of Hispanic Origin. Population growth over the past 10 years within the southern ROI ranged from 48.50% in Hidalgo County, Texas to –23.30% in Terrell County, Texas. Population density varied greatly through the southern ROI ranging from 670.8 persons per square mile in El Paso, Texas to 0.5 persons per square mile in Terrell County, Texas.

3.3.3 Economic Activity

3.3.3.1 Northern Border Economic Activity

Table 3-13 summarizes the total number of jobs in the northern ROI by county. St. Louis County, Minnesota had the largest numbers of jobs in the ROI while Liberty County, Montana had the lowest. Cook County, Minnesota had the highest increase in the number of jobs (58%) followed by Rolette County, North Dakota (40%).

Table 3-14 summarizes the Total Personal Income (TPI) for the northern ROI. TPI ranged from $5,111,192 in St. Louis County, Minnesota to $45,132 in Liberty County, Montana. The average annual growth rate over the past 10 years ranged from 6.9% in Cook County, Minnesota to 0.8% in both Liberty County, Montana and Bottineau County, North Dakota. The average annual growth rate of TPI for the U.S. was 5.4%.

Per Capita Personal Income (PCPI) data for the northern ROI is summarized in Table 3-15. PCPI ranged from $29,731 in Daniels County, Montana to $14,916 in Rolette County, North Dakota. All the counties, with the exception of Daniels County, Montana (104%) and Pembina County, North Dakota (103%), were below the National average of $28,549. The average annual growth rate of PCPI ranged from 7.2% in Cavalier County, North Dakota to 1.0% in Liberty County, Montana. The average annual growth rate of the Nation was 4.4%. Poverty levels for all counties within the study area are presented

Table 3-13. Total Number of Jobs within the Northern ROI

Geographic Region	1989	1999	Percent Change
Montana			
Glacier	5,424	5,929	9
Toole	3,004	3,421	14
Liberty	1,139	1,276	12
Hill	8,605	9,906	15
Blaine	2,946	2,959	<1
Phillips	2,814	2,767	-1
Valley	4,371	4,789	9
Daniels	1,377	1,717	25
Sheridan	2,504	2,512	<1
North Dakota			
Divide	1,718	1,711	<-1
Burke	1,597	1,516	-5
Renville	1,494	1,552	4
Bottineau	3,942	4,334	9
Rolette	4,552	6,363	40
Towner	2,160	2,012	-7
Cavalier	3,304	3,405	3
Pembina	5,507	6,386	16
Minnesota			
Kittson	2,957	3,176	
Roseau	9,489	12,290	30
Lake of the Woods	1,870	2,538	36
Koochiching	7,318	8,210	12
Carlton	13,336	17,354	30
St. Louis	100,159	119,313	19
Lake	4,353	5,552	27
Cook	2,403	3,793	58
Wisconsin			
Douglas	19,151	21,467	12
Bayfield	5,223	6,326	21
Ashland	9.302	10,846	17
Iron	2,513	3,389	35

Source: Regional Economic Information System

Table 3-14. Total Personal Income for the Northern ROI

Geographic Region	1989 TPI (rank) in thousands of dollars	1999 TPI (rank) in thousands of dollars	Percent State Total	Average Annual Growth Rate (Percent)
Montana				**5.2**
Glacier	$144,058 (17th)	$191629 (18th)	1	2.9
Toole	$85,770 (32nd)	$113,947 (32nd)	0.6	2.9
Liberty	$41,828 (40th)	$45,132 (44th)	0.2	0.8
Hill	$254,695 (10th)	$364,273 (10th)	1.9	3.6
Blaine	$86,280 (31st)	$110,787 (34th)	0.6	2.5
Phillips	$73,202 (35th)	$81,579 (36th)	0.4	1.1
Valley	$122,933 (21st)	$184,073 (22nd)	0.9	4.1
Daniels	$35,496 (44th)	$58,362 (41st)	0.3	5.1
Sheridan	$66,692 (36th)	$99,565 (35th)	0.5	4.1
North Dakota				**4.7**
Divide	$36,367 (44th)	$50,190 (39th)	0.3	3.3
Burke	$37,212 (42nd)	$48,321 (43rd)	0.3	2.6
Renville	$38,942 (39th)	$46,276 (44th)	0.3	1.7
Bottineau	$115,047 (18th)	$124,987 (21st)	0.8	0.8
Rolette	$122,238 (17th)	$212,239 (14th)	1.4	5.7
Towner	$48,472 (35th)	$54,969 (37th)	0.4	1.3
Cavalier	$84,362 (22nd)	$131,574 (18th)	0.9	4.5
Pembina	$161,105 (13th)	$245,008 (12th)	1.7	4.3
Minnesota				**6.0**
Kittson	$98,874 (79th)	$133,736 (80th)	0.1	3.1
Rouseau	$225,020 (54th)	$348,987 (55th)	0.2	4.5
Lake of the Woods	$59,127 (85th)	$93,958 (85th)	0.1	4.7
Koochiching	$209,127 (56th)	$338,899 (56th)	0.2	4.9
Carlton	$399,050 (33rd)	$692,514 (33rd)	0.5	5.7
St. Louis	$3,125,576 (5th)	$5,118,192 (6th)	3.5	5.1
Lake	$139,020 (79th)	$240,641 (70th)	0.2	5.6
Cook	$64,021 (84th)	$125,149 (83rd)	0.1	6.9
Wisconsin				**5.5**
Douglas	$582,201 (29th)	$925,591 (31st)	0.6	4.7
Bayfield	$180,770 (62nd)	$297,789 (64th)	0.2	5.1
Ashland	$214,264 (57th)	$346,157 (58th)	0.2	4.9
Iron	$77,919 (70th)	$134,182 (70th)	0.1	5.6

Source: BEARFACTS 2001

Table 3-15. Per Capita Personal Income for the Northern ROI

Geographic Region	1989 PCPI (rank)	1999 PCPI (rank)	Percent of State Average	Percent National Average	Average Annual Growth Rate (Percent)
Montana					**4.2**
Glacier	$11,971 (49th)	$15,205 (53rd)	69	53	2.4
Toole	$16,667 (3rd)	$24,568 (3rd)	112	86	4.0
Liberty	$18,086 (2nd)	$20,032 (25th)	91	70	1.0
Hill	$14,482 (18th)	$21,365 (19th)	97	75	4.0
Blaine	$12,447 (43rd)	$15,661 (52nd)	71	55	4.2
Phillips	$13,927 (25th)	$17,387 (41st)	79	61	2.2
Valley	$14,550 (17th)	$22,636 (10th)	103	79	4.5
Daniels	$15,143 (10th)	$29,731 (1st)	135	104	7.0
Sheridan	$13,550 (29th)	$24,284 (7th)	110	85	6.0
North Dakota					**4.9**
Divide	$12,265 (35th)	$21,879 (17th)	94	77	6.0
Burke	$11,720 (43rd)	$22,074 (15th)	95	77	6.5
Renville	$11,898 (38th)	$16,533 (44th)	71	58	3.3
Bottineau	$13,923 (15th)	$17,261 (43rd)	74	60	2.2
Rolette	$9,605 (50th)	$14,916 (47th)	64	52	4.4
Towner	$12,871 (27th)	$18,602 (36th)	80	65	3.8
Cavalier	$13,602 (19th)	$27,292 (4th)	117	96	7.2
Pembina	$16,969 (2nd)	$29,339 (1st)	126	103	5.6
Minnesota					**4.9**
Kittson	$16,784 (14th)	$25,843 (17th)	84	91	4.4
Roseau	$15,219 (46th)	$21,696 (67th)	71	76	3.6
Lake of the Woods	$14,610 (55th)	$20,333 (77th)	66	71	3.4
Koochiching	$13,456 (71st)	$22,753 (50th)	74	80	5.4
Carlton	$13,735 (68th)	$21,990 (62nd)	72	77	4.8
St. Louis	$15,829 (32nd)	$26,460 (14th)	86	93	5.3
Lake	$13,367 (72nd)	$22,354 (58th)	73	78	5.3
Cook	$16,637 (16th)	$26,226 (15th)	85	92	4.7
Wisconsin					**4.7**
Douglas	$13,943 (43rd)	$21,542 (43rd)	79	75	4.4
Bayfield	$12,956 (57th)	$19,390 (62nd)	71	68	4.1
Ashland	$12,971 (56th)	$21,120 (46th)	77	74	5.0
Iron	$12,711 (62nd)	$21,305 (44th)	78	75	5.3

Source: BEARFACTS 2001

in Table 3-16. Poverty estimates of people of all ages in poverty for the ROI range from 33.6% in Glacier County, Montana to 7.7% in Cook and Roseau County, Minnesota.

Table 3-16. Number of People of All Ages in Poverty within the Northern ROI

Geographic Region	Number of all ages in Poverty	Percent of all ages in Poverty
United States	**35,573,858**	**13.3**
Montana	**135,691**	**15.5**
Glacier	4,198	33.6
Toole	745	15.9
Liberty	320	14.4
Hill	3,314	19.2
Blaine	1,904	26.8
Phillips	924	19.3
Valley	1,492	18.0
Daniels	272	13.6
Sheridan	528	12.5
North Dakota	**78,461**	**12.5**
Divide	291	12.6
Burke	282	12.1
Renville	295	10.5
Bottineau	905	12.6
Rolette	4,380	30.7
Towner	443	14.8
Cavalier	649	12.9
Pembina	882	10.4
Minnesota	**417,797**	**8.9**
Kittson	640	12.2
Roseau	1,246	7.7
Lake of the Woods	417	9.1
Koochiching	1,760	11.7
Carlton	3,123	10.3
St. Louis	22,568	11.7
Lake	866	8.1
Cook	367	7.7
Wisconsin	**478,698**	**9.2**
Douglas	5,702	13.4
Bayfield	2,139	13.9
Ashland	2,460	15.4
Iron	741	11.7

Source: U.S. Census Bureau 2001

3.3.3.2 Southern Border Income and Poverty

Table 3-17 summarizes the total number of jobs in the southern ROI split by county. El Paso County, Texas had the largest numbers of jobs in the ROI while Terrell County, Texas had the lowest. Webb County, Texas had the highest increase in the number of jobs (62%) followed closely by Zapata (36%) and Hidalgo (30%) Counties, Texas.

Table 3-17. Total Number of Jobs within the Southern ROI

Geographic Region	1989	1999	Percent Change
New Mexico			
Hidalgo	3,005	2,976	-1
Luna	6,238	8,795	41
Dona Ana	57,482	73,381	28
Texas			
El Paso	264,814	320,956	21
Hudspeth	1,139	1,431	24
Jeff Davis	927	1,310	41
Presidio	1,984	2,509	26
Brewster	3,951	5,325	35
Terrell	826	833	1
Val Verde	15,427	19,937	29
Kinney	1,039	1,121	8
Maverick	9,617	14,844	54
Webb	50,673	82,016	62
Zapata	2,539	3,987	57
Starr	10,298	16,227	6
Hidalgo	132,469	199,467	51
Cameron	94,204	134,100	42

Source: Regional Economic Information System, 2001

Table 3-18 summarizes the TPI for the southern ROI. TPI ranged from $7,134,999 in Hidalgo County, Texas to $26,308 in Terrell County, Texas. The average annual growth rate over the past 10 years ranged from 9.8% in Starr County, Texas to 1.9% in Terrell County, Texas. The average annual growth rate of TPI for the U.S.was 5.4%.

Table 3-18. Total Personal Income for the Southern ROI

Geographic Region	1989 TPI (rank) in thousands of dollars	1999 TPI (rank) in thousands of dollars	Percent State Total	Percent Average Annual Growth Rate
New Mexico				**6.0**
Hidalgo	$73,153 (27th)	$102,576 (27th)	0.3	3.4
Luna	$197,777 (20th)	$344,878 (19th)	0.9	5.7
Dona Ana	$1,607,211 (3rd)	$2,896,590 (3rd)	7.6	6.1
Texas				**7.0**
El Paso	$6,789,799 (6th)	$12,084,353 (7th)	2.2	5.9
Hudspeth	$28,712 (234th)	$44,693 (232nd)	0	4.5
Jeff Davis	$23,422 (243rd)	$35,099 (241st)	0	4.1
Presidio	$53,080 (216th)	$96,161 (204th)	0	6.1
Brewster	$98,936 (181st)	$176,834 (177th)	0	6.0
Terrell	$21,782 (245th)	$26,308 (244th)	0	1.9
Val Verde	$425,135 (71st)	$703,751 (75th)	0.1	5.2
Kinney	$28,587 (236th)	$49,521 (230th)	0	5.6
Maverick	$239,629 (114th)	$526,588 (97th)	0.1	8.2
Webb	$1,129,372 (36th)	$2,726,239 (27th)	0.5	9.2
Zapata	$70,872 (200th)	$142,885 (188th)	0	7.3
Starr	$191,605 (129th)	$485,887 (103rd)	0.1	9.8
Hidalgo	$3,291,893 (14th)	$7,134,999 (12th)	1.3	8.0
Cameron	$2,333,819 (20th)	$4,699,926 (20th)	0.9	7.3

Source: BEARFACTS 2001

PCPI data for the southern ROI is located in Table 3-19. PCPI ranged from $21,887 in Terrell County, Texas to $8,588 in Starr County, Texas. All the counties were below the National average of $28,549. The average annual growth rate of PCPI ranged from 6.0% in Starr County, Texas to 2.0% in Jeff Davis County, Texas. The average annual growth rate of the Nation was 4.4%. Poverty levels for all counties within the study area are presented in Table 3-20. Poverty estimates for the ROI range from 39.7% in Maverick County, Texas to 16.6% in Jeff Davis County, Texas of people of all ages in poverty.

Table 3-19. Per Capita Personal Income for the Southern ROI

Geographic Region	1989 PCPI (rank)	1999 PCPI (rank)	Percent of State Average	Percent National Average	Average Annual Growth Rate (Percent)
New Mexico					**4.5**
Hidalgo	$12,190 (17th)	$17,019 (22nd)	78	60	3.4
Luna	$11,005 (26th)	$14,158 (31st)	65	50	2.6
Dona Ana	$12,088 (19th)	$17,003 (23rd)	78	60	3.5
Texas					**5.1**
El Paso	$11,687 (203rd)	$17,216 (212th)	64	60	3.9
Hudspeth	$10,011 (234th)	$44,693 (232nd)	51	48	3.3
Jeff Davis	$11,962 (197th)	$14,534 (234th)	54	51	2.0
Presidio	$8,221 (248th)	$10,739 (252nd)	40	38	2.7
Brewster	$11,377 (211th)	$20,111 (148th)	75	70	5.9
Terrell	$14,274 (85th)	$21,887 (97th)	82	77	4.4
Val Verde	$10,757 (230th)	$15,926 (225th)	59	56	4.0
Kinney	$9,413 (238th)	$14,292 (235th)	53	50	4.3
Maverick	$6,727 (252nd)	$10,826 (251st)	40	38	4.9
Webb	$8,691 (247th)	$14,112 (239th)	53	49	5.0
Zapata	$7,763 (249th)	$12,494 (249th)	47	44	4.9
Starr	$4,813 (254th)	$8,588 (254th)	32	30	6.0
Hidalgo	$8,729 (246th)	$13,339 (244th)	50	47	4.3
Cameron	$9,098 (241st)	$14,280 (236th)	53	50	4.6

Source: BEARFACTS 2001

Table 3-20. Number of People of All Ages in Poverty within the Southern ROI

Geographic Region	Number of all ages in Poverty	Percent of all ages in Poverty
United States	**35,573,858**	**13.3**
New Mexico	**333,913**	**19.3**
Hidalgo	1,393	22.6
Luna	7,219	29.8
Dona Ana	44,490	26.6
Texas	**3,259,559**	**16.7**
El Paso	193,843	27.8
Hudspeth	1,033	32.9
Jeff Davis	389	16.6
Presidio	3,079	35.6
Brewster	1,950	22.7
Terrell	248	20.9
Val Verde	12,846	29.5
Kinney	913	26.0
Maverick	19,111	39.7
Webb	61,235	32.6
Zapata	3,722	32.1
Starr	26,183	46.7
Hidalgo	196,989	37.6
Cameron	114,709	35.3

Source: U.S.Census Bureau 2001

3.3.3.3 Housing

<u>Northern Border Housing</u>

Table 3-21 summarizes the total number of housing units divided by county. The largest amount of housing units is located in St. Louis County, Minnesota while the smallest is located is located in Liberty County, Montana. The highest number of vacant housing units is in St. Louis County, Minnesota and the lowest is in Liberty County, Montana. The highest density of housing units per square mile is in Carlton County (15.9), Minnesota and the lowest housing density is in Phillips County (0.5), Montana.

Table 3-21. Housing Units within the Northern ROI

Geographic Region	Total Housing Units	Occupied Housing Units	Vacant Housing units	Houses per square mile
Montana	**412,633**	**358,667**	**53,966**	**2.8**
Glacier County	5,243	4,304	939	1.8
Toole County	2,300	1,962	338	1.2
Liberty County	1,070	833	237	0.7
Hill County	7,453	6,457	996	2.6
Blaine County	2,947	2,501	446	0.7
Phillips County	2,502	1,848	654	0.5
Valley County	4,847	3,150	1,697	1
Daniels County	1,154	892	262	0.8
Sheridan County	2,167	1,741	426	1.3
North Dakota	289,677	257,152	32,525	4.2
Divide County	1,469	1,005	464	1.2
Burke County	1,412	1,013	399	1.3
Renville County	1,413	1,085	328	1.6
Bottineau County	4,409	2,962	1,447	2.6
Rolette County	5,027	4,556	471	5.6
Towner County	1,558	1,218	340	1.5
Cavalier County	2,725	2,017	708	1.8
Pembina County	4,115	3,535	580	3.7
Minnesota	**2,065,946**	**1,895,127**	**170,819**	**26**
Kittson County	2,719	2,167	552	2.5
Roseau County	7,101	6,190	911	4.3
Lake of the Woods County	3,238	1,903	1,335	2.5
Koochiching County	7,719	6,040	1,679	2.5
Carlton County	13,721	12,064	1,657	15.9
St. Louis County	95,800	82,619	13,181	15.4
Lake County	6,840	4,646	2,194	3.3
Cook County	4,708	2,350	2,358	3.2
Wisconsin	**2,321,144**	**2,084,544**	**236,600**	**42.7**
Douglas County	20,356	17,808	2,548	15.5
Bayfield County	11,640	6,207	5,433	7.9
Ashland County	8,883	6,718	2,165	8.5
Iron County	5,706	3,083	2,623	7.5

Source: U.S. Census Bureau 2001

Southern Border Housing

Table 3-22 summarizes the total number of housing units divided by county in the southern ROI. The largest amount of housing units is located in El Paso County, Texas while the smallest is located is located in Terrell County, Texas. The larges number of vacant housing units is in El Paso, Texas while the smallest amount is in Terrell County, Texas. The highest density of housing units per square mile is in El Paso County, Texas (221.3) while the smallest is in Hudspeth County, Texas (0.3).

3.3.4 Environmental Justice

EO 12898 of February 11, 1994, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" required each Federal agency to identify and address, as appropriate, disproportionate adverse effects of its proposed actions on minority populations and low-income communities.

The potential to generate disproportionately high environmental health and safety risks to children as required by EO 13045, "Protection of Children from Environmental Health Risks" is also addressed in this section. This EO was prompted by the recognition that children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults.

3.3.4.1 Northern Border

Areas within the northern ROI with a low PCPI and high percentage of people in poverty are particularly sensitive to environmental justice issues. Glacier, Blaine, and Phillips Counties in Montana, Renville, Bottineau and Towner Counties in North Dakota, and Bayfield County in Wisconsin all have relatively low PCPI. In addition Glacier and Blaine Counties in Montana, and Rollete County in North Dakota have relatively high poverty rates. As a result these counties are particularly sensitive to environmental justice issues due to low income populations. Furthermore, Glacier County, Montana and Rolette County, North Dakota both have a high Native American population which makes them also sensitive to environmental justice issues in relation to minority populations.

3.3.4.2 Southern Border

The southern ROI predominantly consists of people claiming Hispanic origin, which qualifies as a minority population. All the counties within the ROI with the exception of

Table 3-22. Housing Units within the Southern ROI

Geographic Region	Total Housing Units	Occupied Housing Units	Vacant Housing units	Houses per square mile
New Mexico	780,579	677,971	102,608	6.4
Hidalgo County	2,848	2,152	696	0.8
Luna County	11,291	9,397	1,894	3.8
Dona Ana County	65,210	59,556	5,654	17.1
Texas	8,157,575	7,393,354	764,221	31.2
El Paso County	224,447	210,022	14,425	221.5
Hudspeth County	1,471	1,092	379	0.3
Jeff Davis County	1,420	896	524	0.6
Presidio County	3,299	2,530	769	0.9
Brewster County	4,614	3,669	945	0.7
Terrell County	991	443	548	0.4
Val Verde County	16,288	14,151	2,137	5.1
Kinney County	1,907	1,314	593	1.4
Maverick County	14,889	13,089	1,800	11.6
Webb County	55,206	50,740	4,466	16.4
Zapata County	6,167	3,921	2,246	6.2
Starr County	17,589	14,410	3,179	14.4
Hidalgo County	192,658	156,824	35,834	122.7
Cameron County	119,654	97,267	22,387	132.1

Source: U.S. Census Bureau 2001

Jeff Davis, Brewster, and Terrell Counties in Texas have over 50% of their population claiming Hispanic origin. Furthermore all the counties in the southern ROI have a relatively low PCPI and relatively high percent of their populations in Poverty. Within every county the PCPI is below the national average while the percentage of people in poverty is above the national average. As a result all of the counties within the southern ROI are particularly sensitive to environmental justice concerns.

SECTION 4.0
ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This section of the PEA addresses potential impacts associated with the implementation of the alternatives outlined in Section 2.0. For the purposes of this impact analysis, several assumptions were made by the NEPA Team regarding the area of potential impact.

INS officials estimated the number of RVS systems that would be located on poles, towers, and those systems that could be co-located on buildings or other towers in order to evaluate potential impact from the proposed RVS systems. Of the proposed RVS systems, the estimated number by sector to be mounted on poles, towers, or co-located are given in Table 4-1.

Table 4-1. Estimated Number of Pole, Tower, and Co-located RVS Systems

	Sector	Pole Mounted	Tower Mounted	Co-located	Total
Northern Border	Havre	400	50	0	450
	Grand Forks	350	50	0	400
Southwest Border	El Paso	75	20	3	98
	Marfa	100	10	0	110
	Del Rio	96	10	0	106
	Laredo	92	10	6	108
	McAllen	250	30	4	284
TOTAL		**1,363**	**180**	**13**	**1,556**

It should be emphasized that all of these estimates should be considered worst-case scenarios. For example, the number of RVS systems that can be co-located would increase in the future as additional communications towers and buildings are constructed along the border areas. Additionally, the number of tower mounted RVS systems would decrease as site-specific areas are identified where pole mounted RVS systems would suffice. Both of these scenarios would decrease the potential impacts; however, a worst-case scenario was used to estimate the potential impacts. Impacts from electrical supply (i.e. overhead utility lines, underground utility lines) and access roads are not addressed in this PEA since there are no site-specific data available at the present. Given these assumptions, the anticipated impacts from the 1,556 proposed RVS systems are quantified in Table 4-2.

Table 4-2. Anticipated Impacts from Proposed RVS Systems

Type of RVS System (# of systems X impact area)	Acres Impacted
Pole Mounted (1363 poles X 36 ft^2)	1.1
Tower Mounted (180 towers X 900 ft^2)	3.7
Co-located (13 systems - no impacts)	0
Total	**4.8**

For the purposes of this PEA, the NEPA Team assumed a worst-case scenario to quantify the maximum impacts that could occur. It is assumed that if all the proposed RVS systems were tower mounted, then this situation would produce the greatest amount of impacts. Therefore, the following sections will assume that the maximum acres impacted would be a maximum of 32.1 acres (1,556 systems X 900ft^2). It was also assumed that many of the proposed RVS systems would utilize solar power, a self-contained generator system, or existing power sources. Potential impacts from electrical power supply via adjacent electrical grids cannot be quantified at this time. The NEPA team assumed that significant impacts from electrical power supply and access roads would require separate NEPA compliance.

4.1 Physical Resources

4.1.1 Soils

4.1.1.1 No Action Alternative

With the implementation of the No Action Alternative, there would be no impacts to soils because no RVS systems would be constructed; however, the USBP would not be as effective in detecting and apprehending illegal entrants and foot traffic would continue at its current level and probably increase. The continuation of illegal traffic and consequent enforcement activities have the potential of adversely impacting soils in the ROI. Uncontrolled foot and vehicle traffic in these areas would increase soil erosion in the ROI.

4.1.1.2 Proposed Action Alternative

Implementation of the Proposed Action Alternative would remove a maximum of 32.1 acres of soil within the ROI from future biological and agricultural production. The ROI would be cleared for both poles as well as towers.

Typical pole placement requires a deep foundation or drill pile that is approximately 4-feet in diameter and 12-feet deep hole. The drill pile excavation, containing the pole, will be backfilled with concrete. Approximately 36 square feet (6 feet X 6 feet) of soil will be removed from production due to the concrete pad which forms the mounting base for each RVS system. The standard RVS tower design will require three circular poured concrete piles, approximately three feet in diameter, to be used as foundations for the tower legs. Approximately 900 square feet (30 feet X 30 feet) of soil will be removed from production due to the area occupied by the towers and associated facilities. Crushed stone is typically placed around the pad. The construction of either tower or poles would remove theses soils from future biological and agricultural production.

Impacts to soils from construction would be minimized with the use of appropriate construction techniques to minimize soil erosion. Erosion control and compaction techniques and other measures such as waterbars, gabions, straw bales and reseeding would be implemented to alleviate these situations. Any construction activity must evaluate the erosion potential of the soils and incorporate erosion control designs into the construction plans. Co-located or building mounted RVS systems negate the need for ground disturbing activities provided an existing power source could be utilized, thus no impacts to soils are expected from co-located or building mounted RVS systems

It is possible that prime farmlands may be present at some of the selected RVS sites; in such cases these soils would be removed from potential agricultural production. In order to evaluate the potential impacts on prime farmlands, the local USDA NRCS office would be contacted once site-specific locations are identified. These local offices would determine if mitigation measures would be needed to offset the impacts caused by construction of the RVS systems.

4.1.2 Cultural Resources

Site-specific NEPA documentation would be developed for each of the proposed RVS sites. This documentation would further discuss any cultural resources that may be impacted by the construction of specific RVS sites.

4.1.2.1 No Action Alternative

Under the No Action Alternative, there would be no construction of RVS systems. As a result the USBP would not be as effective in detecting and apprehending illegal entrants and foot traffic would continue at its current level and probably increase. This illegal traffic has the potential of damaging cultural resources particularly archaeological sites with shallow or surface deposits. As a result the No Action Alternative has the potential to adversely impact cultural resources.

4.1.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, the majority of the RVS systems that would be constructed would be erected on either poles or towers. The construction of these towers would involve ground disturbing activities that have the potential to impact previously unrecorded cultural resources, particularly archaeological sites which may not be readily evident. Consultation with the appropriate SHPO and/or THPO for the area would be required before construction to identify any known cultural resources, including historic structures, archaeological sites, or sacred sites that may have been recorded in the area. In addition, if the area has not undergone a previous archaeological survey one would need to be conducted in the APE of the construction in order to locate any unknown cultural resources within the area. If previously recorded or newly recorded cultural resources are located within the APE then mitigation measures would be required. These mitigation measures would be determined through consultation with the appropriate SHPO and/or THPO. Usually the RVS poles or towers can be relocated to an area where there would be no impacts. In addition, if there are cultural resources, particularly historic structures, districts, or sacred sites, near the proposed pole or tower there could be a potential for a visual impact to those resources. If there is a potential for a significant visual impact then a viewshed analysis may be appropriate to determine the extent of that impact.

To a lesser extent RVS equipment would be mounted on existing structures due to the undeveloped nature of the borders. If the structure is 50 years old or older or a Cold War Era structure, consultation with the SHPO would be necessary. The structure, if not previously evaluated, would be evaluated for inclusion to the NRHP. If the structure is determined or has been determined to be eligible for inclusion in the NRHP then appropriate mitigation measures would be determined through consultation with the appropriate SHPO and/or THPO. Like the construction of poles or towers, avoidance could involve the relocation of the RVS system to another building which is not eligible for inclusion on the NRHP. Also the visual impacts of the mounted RVS equipment would be considered both for the structure itself and for NRHP eligible structures or districts that have a potential for significant visual impacts. A viewshed analysis may be appropriate where there would be a potential for significant visual impacts to these resources.

4.1.3 Water Resources

Site-specific EAs would be developed for each of the proposed RVS systems. These abbreviated EAs would further discuss any local surface or ground water features that may be affected by the proposed project.

4.1.3.1 No Action Alternative

No impacts to water resources would occur under the No Action Alternative; consequently, there would be a continuation (and possibly an increase) of illegal foot and vehicle traffic. This increase in illegal foot and vehicle traffic could result in adverse impacts to water resources in the ROI, especially surface waters and wetlands. Erosion and increased sedimentation rates caused by illegal foot traffic trails could degrade surface waters and wetlands in the ROI. Additionally, the trampling of vegetation from foot traffic could degrade wetlands in the ROI.

4.1.3.2 Proposed Action Alternative

Numerous water bodies and aquifers can be found throughout the ROI. Surface waters would be avoided to the extent practicable during construction of and placement of RVS systems. Available structures already in existence would take preference over new utility poles or towers when mounting the RVS systems. If necessary, new poles or towers needed for placement of the RVS systems would not require ground disturbance deep or wide enough to disturb ground water supplies or cause unnecessary amounts of runoff into surface waters. Proper maintenance of construction equipment and best management practices during construction activities would minimize the possibility of accidental spills of fuels or lubricants that, if they occurred, could affect surface and groundwater quality. Operation and maintenance of the RVS towers would have no effect on the ROI's surface or groundwater supplies and/or quality.

To avoid any potential impacts to water resources, where applicable, the 1,556 proposed RVS systems would be placed at least 0.25 miles from any water bodies, such as stock tanks, drainages, washes/arroyos, and springs if new poles or towers would be required. Some of the proposed RVS systems will contain generators for recharging battery banks on an as needed basis. These self-contained generators are powered with propane eliminating the potential for water contamination. No petroleum products, oil, or lubricants will be required for generators use in association with the proposed RVS systems.

Impacts to Waters of the U.S. or wetlands are expected to be avoided by using the site selection criteria and the project environmental review checklist. Once site-specific locations are determined with the aid of the site selection criteria, field surveys and the project environmental review checklist would be completed to determine if jurisdictional wetlands occur within the site-specific area. If jurisdictional wetlands are identified and cannot be avoided, consultation with the appropriate USACE district and applicable permits would be required before beginning construction of the RVS site.

4.1.4 Air Quality

4.1.4.1 No Action Alternative

Air quality would not be significantly affected by the implementation of the No Action Alternative. Without the proposed RVS systems, additional patrol activities would become increasingly necessary, which could exacerbate fugitive dust within the ROI. Increased exhaust emissions from patrol vehicles may occur due to increased and more aggressive enforcement efforts. The magnitude of these effects would depend upon several variables including number of vehicle trips, climatic conditions, and soil types. Any change in air emissions would be insignificant and air quality would remain virtually the same as described in Chapter 3.

4.1.4.2 Proposed Action Alternative

Construction activities would be limited to small, isolated locations during installation of the RVS equipment. The short duration of these activities, the type of equipment used, and the good dispersion patterns of the region, indicate that air emissions would not be created that would adversely affect regional air quality. Proper and routine maintenance of all heavy construction equipment, vehicles, generators, and other equipment would be implemented to ensure that air emissions are within the design standards of the piece of equipment. Construction sites will be kept wet, to the extent practicable, to reduce fugitive dust problems. Maintenance vehicles driving to and from the RVS sites would be the only emission source required by the operation and maintenance of the RVS towers.

Generators have the potential to be used as an energy source for some of the RVS systems. Emissions and their effect on the region will depend on the hours of operation, type of equipment used and the dispersion patterns of the region. However, since the generators would be used intermittently to charge batteries on an as-needed basis, the effects on regional air quality would be minor, localized, and temporary. Proper and routine maintenance and the limited use of these generators would ensure that minimal air emissions would result.

4.1.5 Noise

4.1.5.1 No Action Alternative

The No Action Alternative would not result in any increases or decreases in ambient noise levels. The current illegal foot traffic, and other illegal activity would continue and probably increase resulting in the need for additional patrols or aerial reconnaissance along the border which would increase ambient noise levels.

4.1.5.2 Proposed Action Alternative

This alternative would result in construction noise during RVS system installation along the entire border; however, construction would occur in phases, be short in nature, and generally occur in remote locations where sensitive noise receptors are not present.

Construction activities would increase noise levels temporarily at locations immediately adjacent to the RVS sites. Noise levels created by construction equipment would vary greatly depending on factors such as the type of equipment, the specific model, the operation being performed, and the condition of the equipment. The equivalent sound level (Leq) of the construction activity also depends on the fraction of time that the equipment is operated over the time period of the construction. Heavy equipment such as backhoes and cement and dump trucks would cause temporary, localized, minor increases in noise levels during construction. RVS system installation does not generally involve a lot of equipment or require noisy construction equipment or techniques.

A construction noise assessment would not be required because RVS system installation does not last for more than several days, noisy equipment is not involved, and in most cases would not take place near a noise-sensitive site (i.e. residential areas or institutions). Most construction activities resulting from this alternative would produce only short-term noise level increases. Construction would occur only during daylight hours, thus reducing the DNLs and the chances of causing annoyances. No blasting would be expected. Since construction would only occur during daylight hours, these short-term increases are not expected to substantially affect adjacent noise sensitive receptors or wildlife areas.

Generators associated with some of the proposed RVS systems would not significantly increase the ambient day-night average sound level (DNL) of the area. These generators would be used primarily in rural areas where access to electrical power sources is not readily available and, thus, away from most residential areas. The self-contained generators would produce minimal additional noise and raise the ambient noise levels slightly. However, since the generators would be used intermittently to charge batteries on an as-needed basis, the effects of noise would be minor, localized, and temporary. In urban areas, electric power from adjacent grids is the preferred power source; therefore, noise sensitive receptors are bit usually located in proximity to RVS systems utilizing generators as a backup power source.

4.2 Biological Resources

4.2.1 Vegetation Communities

Site-specific EAs would be developed for each of the proposed RVS sites. These abbreviated EAs would further discuss local vegetation communities that may be affected by the proposed project.

4.2.1.1 No Action Alternative

Under the No Action Alternative, there would be no construction of RVS systems and the USBP would not be as effective in detecting and apprehending illegal entrants and foot traffic. Illegal activity along the borders would continue at its current level and probably increase. Therefore, illegal traffic would continue to adversely impact vegetation communities in the ROI. Illegal entrants would continue to alter vegetation communities by cutting vegetation for shelter and fire, by causing accidental wildfires, and trampling vegetation in the ROI.

4.2.1.2 Proposed Action Alternative

Very little vegetation would be damaged under the Proposed Action Alternative; in fact, assuming a worst-case scenario approximately 32.1 acres would be impacted for the entire northern and southern borders ROI exclusive of any access roads and powerline ROWS that might be required. Vegetation would be avoided during construction of and placement of RVS systems and previously disturbed areas would be utilized when available. Additionally, available structures already in existence would take preference over new pole or tower construction when locating the RVS systems to further reduce impacts to vegetation communities. Impacts to vegetation communities are expected to be minimized by using the site selection criteria and the project environmental review checklist. Once site-specific locations are determined with the aid of the site selection criteria, field surveys and the project environmental review checklist would be completed to determine the vegetation communities that occur within the site-specific area

It was assumed for the purposes of this PEA that installation and operation of the RVS systems would not require any additional vegetation outside the construction footprint to be removed. Furthermore, RVS systems are strategically placed upon topographically advantageous locations which allow for optimum viewing levels (i.e. peaks, ridges, and hill tops) thus the removal of mature trees and vegetation is generally not necessary. Site-specific surveys by qualified environmental professionals will assist the USBP in avoiding rare, unique, or protected vegetation specimens or communities. However, if additional clearing of vegetation were required, site-specific surveys would be conducted in conjunction with the proper NEPA documentation. Due to the limited size of the area required for each system and the presence of similar habitat in the surrounding areas, impacts to vegetation communities would be insignificant. Once the RVS systems are installed, the operation and maintenance of the systems would have no effect on the vegetation within the ROI.

4.2.2 Wildlife Resources

4.2.2.1 No Action Alternative

Under the No Action Alternative, there would be no construction of RVS systems. As a result the USBP would not be as effective in detecting and apprehending UDAs and illegal foot and vehicle traffic would continue at its current level and probably increase. This illegal traffic damages vegetation communities and thereby causes synergistic impacts to wildlife from the trampling of vegetation. As a result the No Action Alternative has the potential to adversely impact wildlife communities in the ROI.

4.2.2.2 Proposed Action Alternative

Wildlife movement at the proposed pole or tower locations could potentially be impacted by construction activities. The greatest movement of small animals generally happens when a disturbance occurs. Mobile animals escape to areas of similar habitat, while other slow or sedentary animals such as reptiles, amphibians, and small mammals could potentially be lost. This displacement and/or reduction in the number of animals would not significantly impact animal communities due to the presence of similar habitat adjacent to the proposed locations. Larger terrestrial wildlife movements in the construction area would not be affected due to the short duration of construction activities. Site-specific surveys by qualified environmental professionals will assist the USBP in minimizing impacts to important wildlife habitat.

The operation and maintenance of the systems would have no effect on the region's wildlife once the RVS towers are installed.

4.2.3 Threatened and Endangered Species and Critical Habitat

Site-specific NEPA documentation would be developed for each of the proposed RVS sites. These documents would further discuss any protected species or critical habitat that may be affected by the proposed project.

4.2.3.1 No Action Alternative

RVS systems would not be constructed under the No Action Alternative. As a result, the USBP would not be as effective in detecting and apprehending illegal entrants and foot traffic would continue at its current level and probably increase. This illegal traffic has the potential of adversely impacting threatened and endangered species in the ROI. Illegal entrants could impact threatened and endangered species by cutting vegetation for shelter and fire, by causing accidental wildfires, by disturbing sensitive nesting areas or activities, by increasing erosion through repeated use of trails, or by trampling of threatened or endangered plant species.

4.2.3.2 Proposed Action Alternative

Protected species occur in each of the states covered by this PEA. Consultation with the USFWS and the state agency that handles protected species would be required before any RVS installation would occur. Before installation of the RVS systems, each site would be further evaluated and surveyed for threatened and endangered species and critical habitat by a qualified environmental professional. If RVS poles or towers cannot avoid areas that have been deemed as critical habitat or is in an area that would affect threatened or endangered species populations, formal Section 7 consultation would be initiated with the USFWS, as required by the ESA.

4.2.4 Unique and Environmentally Sensitive Areas

4.2.4.1 No Action Alternative

With the implementation of the No Action Alternative, there would be no construction of RVS systems. As a result the USBP would not be as effective in detecting and apprehending illegal entrants and foot traffic would continue at its current level and probably increase. This illegal traffic would continue to damage unique and sensitive areas in the ROI. As a result the No Action Alternative has the potential to adversely impact unique and sensitive areas. Illegal entrants would continue to impact unique and sensitive areas in the ROI by causing accidental wildfires, by creating trails and increasing erosion through the repeated use of these trails, and by discarding trash within these areas.

4.2.4.2 Proposed Action Alternative

Impacts to unique and sensitive areas under the completion of the Proposed Action Alternative are unknown at this time. The impacts to these areas will have to be established based upon site-specific surveys, which would depend upon the specific locations of the RVS systems. Impacts to unique and sensitive areas would be addressed in conjunction with the site-specific surveys, project environmental review checklist, and subsequent NEPA documentation. Site selection criteria and the project environmental review checklist would ensure that unique and sensitive areas are avoided where practical. If unique and sensitive areas are not avoided, then subsequent NEPA documents would be necessary.

4.3 Socioeconomic Resources

4.3.1 Land Use

4.3.1.1 No Action Alternative

Land use would continue as it currently exists under the No Action Alternative.

4.3.1.2 Proposed Action Alternative

By executing the Proposed Action Alternative land use for the site-specific locations of the RVS systems would change. In areas where poles or towers are selected for installation, land use would change from existing land uses to the proposed RVS systems. All areas outside of the permanent footprint of the RVS systems would be returned to the previous land use. All land use changes would be localized and remain within the footprint of the chosen RVS systems location; therefore, land use on a regional basis would not be affected. Operation and maintenance activities would not alter land use in the ROI.

4.3.2 Socioeconomics

4.3.2.1 No Action Alternative

Under the No Action Alternative, no construction would take place. As a result, there would be no temporary direct benefits from construction through purchasing of construction materials and other project expenditures. In addition, the current illegal foot traffic, and other illegal activity would continue which would result in a probable increase in insurance costs, property losses, law enforcement expenses, and other social costs (i.e., drug rehabilitation, medical expenses, and labor opportunities). The No Action

Alternative would continue to endanger the lives and increase health risks to UDAs attempting to cross both the southern and northern borders and the safety of USBP agents who attempt to apprehend them.

4.3.2.2 Proposed Action Alternative

The labor for this alternative would be provided by private contractors from outside the region, resulting in only temporary increases in the population of the project area. When possible, materials and other project expenditures would predominantly be obtained through merchants in the local community resulting in a temporary direct economic benefit. All construction activities, regardless of the area, would be limited to daylight hours only. Safety buffer zones would be designated around all construction sites to ensure public health and safety. No residential or commercial/industrial facilities would be displaced by the proposed action. No displacement would result from this action and, therefore, there would be no direct impacts to housing in the area. No changes to local employment rates, poverty levels, or local incomes would occur as a result of this project. No impacts to health or human safety would result from the proposed RVS systems. The increased surveillance along both the northern and southern borders would, in turn, reduce illegal traffic in those areas. Illegal immigration in areas has been associated with increased reports of car theft, prowlers, break-ins, and other illegal activities. A reduction in illegal UDA traffic resulting from increased surveillance from the operation of the proposed RVS systems would subsequently reduce crime in these areas.

4.3.3 Environmental Justice/Protection of Children

4.3.3.1 Executive Order 12898 Environmental Justice

This project would not result in any violations of the intent of Executive Order 12898 that addresses environmental justice. The ROI for this project is predominantly Caucasian except where noted in Chapter 3. A large portion of both the northern and southern border consists of low-income populations but there is a small population in the ROI and consequently a low density of housing.

<u>No Action Alternative</u>

Under the No Action Alternative, no increases in surveillance would be conducted. As a result no impact would be anticipated under the No Action Alternative for environmental justice issues.

Proposed Action Alternative

The Proposed Action Alternative would beneficially affect the entire ROI regardless of race and/or income level. The proposed action in this PEA would not result in disproportionately high or adverse environmental health or safety impacts to minority or low-income populations. This conclusion is based on the fact that no significant adverse environmental effects have been identified for any resource area or population (minority, low-income, children, or otherwise) analyzed in this PEA.

4.3.3.2 Executive Order 13045 Protection of Children

Executive Order 13045 requires each Federal Agency "to identify and assess environmental health risks and safety risks that may disproportionately affect children; and "ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This Executive Order was prompted by the recognition that children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults.

No Action Alternative

Under the No Action Alternative, no increases in surveillance from either the establishment of RVS poles or towers would occur. As a result no issues regarding protection of children would occur. The current illegal traffic and its associated criminal activity would continue creating a more unsafe environment for children than under the Proposed Action Alternative.

Proposed Action Alternative

The proposed action as described in this PEA would not result in disproportionately high or adverse environmental health or safety impacts to children. This conclusion is based on the fact that no significant adverse environmental effects have been identified for any resource area or population (minority, low-income, children, or otherwise) analyzed in this PEA. Furthermore, because of the relatively low population and housing densities along the northern and southern borders, construction projects would likely occur away from residential areas where children would likely be encountered. In contrast, the reduction in crime resulting from the increased surveillance would create a safer environment for children throughout the ROI.

4.4 Irreversible and Irretrievable Commitments of Resources Involved In Implementation of the Proposed Action

The proposed action would result in the permanent conversion or loss of up to 32.1 total acres of various habitats. It should be noted that this is a worst-case scenario and INS currently estimates that the actual impacted acreage is anticipated to be closer to 4.8 acres. The proposed action would also require the irretrievable commitment of fuel, labor, building materials, and monetary resources.

4.5 Relationship Between Local and Short-term use of Society's Environment and the Maintenance and Enhancement of Long term Environmental Productivity

Benefits derived from the control of illegal entrants and narcotics trafficking into the U.S. and the adverse impacts associated with the construction activities necessary to accomplish this control represent trade-offs between the local, short-term use and the long-term stability and productivity of society's environment. The proposed action would reduce the flow of illegal drugs and entrants to the U.S. and consequently, reduce the social costs associated with managing these issues. Short-term local adverse direct effects resulting from habitat disturbances would be off-set by long-term regional benefits including protection from illegal vehicle and foot traffic, accidental fires caused by illegal entrants, lower costs to the county for health and emergency services, lower insurance rates for homeowners and business near the border, reduction in crime near the border, and a reduction in illegal traffic breaching and entering near the border.

The proposed action would require the conversion of up to 32.1 acres, cumulatively, depending upon the amount of RVS towers installed. Most of this acreage is expected to have been previously disturbed and does not provide suitable habitat for most wildlife populations. The long-term productivity of these lands would be lost over the life of the proposed project. INS would make every attempt practicable to avoid disturbances to valuable wildlife habitat by using previously disturbed sites for the proposed RVS systems and for construction staging areas.

4.6 Unavoidable Adverse Impacts

This section summarizes some of the potential impacts associated with the proposed RVS systems that would be unavoidable and adverse and that would remain after INS/USBP have implemented the environmental design measures discussed in Chapter 6. Additional discussion of unavoidable adverse impacts will be included in subsequent tiered NEPA documents and will be addressed on a site-specific basis.

4.6.1 Physical Resources

Unavoidable adverse impacts would include the permanent removal of up to 32.1 acres of soil from biological and agricultural production.

4.6.2 Biological Resources

Unavoidable adverse impacts to biological resources would include the loss of small pieces of habitat totaling less than 32.1 acres. The pieces that would be disturbed are habitat for terrestrial plant and animal species that are widespread throughout the region. Impacts to threatened and endangered species and critical habitat will be evaluated on a site-specific basis.

SECTION 5.0
CUMULATIVE IMPACTS

5.0 CUMULATIVE IMPACTS

This section of the PEA addresses the potential cumulative impacts associated with the implementation of the alternatives outlined in Section 2.0 and other projects/programs that are planned for the region. The following paragraphs present a general discussion regarding cumulative effects that would be expected irrespective of the alternative selected.

The Council of Environmental Quality defines cumulative impacts as the incremental impact of multiple present and future actions with individually minor but collectively significant effects. Cumulative impacts can be concisely defined as the total effect of multiple land uses and developments, including their interrelationships, on the environment.

Available past NEPA documents were reviewed to evaluate cumulative effects of the USBP operations/activities and infrastructure construction projects for the border region. These included, but were not limited to, EAs from previous and current INS projects, a Programmatic Environmental Impact Statement (PEIS) (USACE 1994), an EA for INS infrastructure within Naco-Douglas Corridor (INS 2000), and a Supplemental Programmatic Environmental Impact Statement (USACE 2001). An analysis of each component of the affected environment was completed from the existing documents in order to identify which would have cumulative impacts as a result of the past and proposed activities.

5.1 Federal Projects

USBP Sector headquarters were contacted in order to determine on-going and proposed projects within the sectors of the Central Region. Where possible, estimates of the acres that would be impacted by a project are given. Projects proposed for implementation in the ROI are given in the following list. All projects are in the planning and design phase and quantification of impacts are unknown unless otherwise specified.

Montana

Planned projects in the Havre Sector consist of the construction of a building at Havre Sector Headquarters, clearing adjacent to several of the POEs, and the installation of cameras on buildings at several POEs.

North Dakota

The Grand Forks Sector is presently proposing to construct of a new USBP station in Pembina, North Dakota.

Texas

The construction of new USBP stations in Sierra Blanca, Alpine, and Presidio, Texas are currently scheduled in the Marfa Sector. The Del Rio Sector is planning to construct a new USBP station for the Eagle Pass Station which will impact approximately 37 acres. New border roads are being proposed in the Del Rio Sector along with 10 RVS systems and a communication tower. The Del Rio Sector is forecasting the construction of new USBP stations for the Comstock and Carrizo Springs Stations, which is estimated to impact approximately 10 acres at each location.

Approximately 21 RVS systems and 4 communication towers are currently scheduled to be installed in the Laredo Sector. A USBP checkpoint at milemarker 29 along Interstate Highway (IH) 35 and the use of a temporary USBP checkpoint at the intersection of Camino Columbia Toll Road and IH 35 are also anticipated in the Laredo Sector.

The McAllen Sector is in the planning phase of the construction of a new Sector Headquarters and a new USBP station for the McAllen Station which is estimated to impact approximately 30 acres and 20 acres, respectively. The future Brownsville Station is expected to impact approximately 25 acres in the McAllen Sector. The McAllen Sector is anticipating additional facilities at the Rio Grande City Station and the construction of a new USBP station for the Weslaco Station. Road levee clearing, the replacement of radio towers, and the installation of 21 RVS system are also proposed in the McAllen Sector.

5.2 Cumulative Effects on Resources

Resources such as soil and water resources would be impacted for a short term during and immediately after completion of RVS system installation. None of these resources would be expected to incur significant cumulative adverse impacts. Due to the small area impacted for a single RVS system and the isolated location, the installation of RVS systems does not indicate a potential excursion that could affect soil or water resources. Soils that are denuded during construction activities would be vulnerable to erosion; however, these areas would quickly be re-vegetated or covered in order to prevent erosion.

The primary cumulative effect of the past and proposed projects is permanent loss of vegetation and associated wildlife habitat. Throughout the entire U.S.-Mexico border (California to Texas), a total of about 3,750 acres of vegetation, mostly semi-desert grassland and desert scrub communities, has been removed by Joint Task Force Six (JTF-6) road, range, fence, and helipad repair and other construction activities primarily for the INS (USACE 1999). This represents less than 0.01 percent of the total land area within the area along the entire U.S.-Mexico border.

Since 1994, INS activities were expected to impact about 2,054 acres primarily due to construction of road and fence projects (USACE 2001). These effects combined with the area anticipated to be disturbed over the next five years and the amount altered previous to 1994, would amount to approximately 10,700 acres during the period 1989 to 2004.

Long-term indirect cumulative effects have occurred and would continue to occur. However, these effects, both beneficial and adverse, are difficult, if not impossible, to quantify. Reductions in habitat have undoubtedly created inter- and intra-species competition for available food and shelter and, eventually, slight reductions in some wildlife populations. Decreased patrol activities as a result of the use of RVS systems would decrease the potential for some wildlife specimens to be accidentally hit and killed. Such gains would not be expected to result in significant additions to wildlife populations.

Installations of RVS systems were considered regarding the potential increase for raptors to be electrocuted or to become entangled in overhead powerlines. Injuries and deaths to raptors due to collision with powerlines and support (guide) wires do occur, however studies have indicated these structures do not present a major problem. The proposed RVS systems are not expected to contain support (guide) wires and would not significantly contribute to raptor collisions with towers. RVS poles and towers have the potential to be used by raptors for predation, which may result in a decrease of some prey populations.

Close coordination and approval from the appropriate state agencies would be required for any activity potentially affecting any unique or sensitive areas (i.e., wilderness areas, conservation areas, national parks, etc.) to ensure adverse effects would be avoided or substantially reduced in significance.

According to the USACE (2001) Final Supplemental Programmatic Environmental Impact Statement, the total amount of wetlands and Waters of the U.S. that have been impacted by JTF-6 for INS projects since 1994 has been less than five acres. Impacts to these valuable habitats have been avoided, wherever practicable, resulting in the low acreage figure. Each project that cannot avoid effects to wetland and/or Waters of the U.S would be coordinated through the Section 404 permit process with the appropriate regulatory agencies.

Air emissions have been produced by vehicles, aircraft, and heavy equipment; however, these have not resulted in significant cumulative impacts due to the short duration of the activities, the dispersion capabilities of the region, and the remote locations of most of the operations. Due to the small area impacted for a single RVS system and the isolated location, the installation of RVS systems does not indicate a potential excursion that could violate NAAQS.

Direct cumulative impacts on socioeconomics would be expected to be beneficial but insignificant. The magnitude of the effects would be expected to be insignificant because local expenditures would be minimal and the economic multipliers in the region. Cumulative indirect effects to socioeconomic resources (e.g., purchase of supplies) would be beneficial, but insignificant. The implementation of the Proposed Action Alternative would allow USBP to more efficiently and effectively detect, deter and apprehend illegal traffickers, thereby reducing social costs associated with property damages, violent crimes, drug treatment and rehabilitation, and entitlement programs.

5.2.1 Benefits Associated with INS Activities

Many positive cumulative impacts have also been realized through INS activities. RVS systems and other USBP operations have had cumulative positive impacts on socioeconomic resources within the border area and the nation through reductions in illegal drug smuggling activities. Additional knowledge regarding numerous threatened or endangered species' locations, distribution, and life requisites have been obtained through surveys and monitoring efforts associated with INS actions. INS activities completed from 1994 to 1999 have provided information on over 100 new cultural resource sites considered potentially eligible for NRHP listing.

5.2.2 Other Agencies

Plans by other agencies and private/commercial entities in the region would also affect the region's natural and human environment. Due to the large ROI of this project, a comprehensive list of these projects is not practical. In addition, documents are currently being prepared which could affect areas currently in use by the USBP. The INS and USBP must maintain close coordination with these agencies to ensure that their activities do not conflict with their policies or management plans. Subsequent NEPA documentation would address cumulative effects on a local or regional basis.

SECTION 6.0
ENVIRONMENTAL DESIGN MEASURES

6.0 ENVIRONMENTAL DESIGN MEASURES

This chapter describes those measures that could be implemented to reduce or eliminate potential adverse impacts to the human and natural environment. Many of these measures have been incorporated as standard operating procedures for INS. The mitigation measures are presented for each resource category that could be potentially affected. The proposed mitigation measures would be coordinated through the appropriate agencies and land managers/administrators prior to initiation of construction. Environmental design measures will vary on a case-by-case basis once site-specific locations are identified for the proposed RVS systems and will be discussed in greater detail in subsequent tiered NEPA documents.

6.1 Soils

In order to assess impacts to prime farmland, a Farmland Conversion Impact Rating Form (Form AD-1006) must be completed and submitted to the NRCS (Appendix C). NRCS will measure the relative value of the site as farmland on a scale of 0-100 according to the information sources listed in Sec. 658.5(a) of the Farmland Protection Policy Act (FPPA). After the agency receives the score of the site's relative value as described in Sec. 658.4(a) of the FPPA and then applies the site assessment criteria which are set forth in Sec. 658.5 (b) and (c), the agency would assign to the site a combined score of up to 260 points composed of up to 100 points for relative value and up to 160 points for the site assessment. With this score the agency would be able to identify the effect of its programs on farmland and make a determination as to the suitability of the site for conversion.

Soil erosion control can be greatly enhanced with the use of Best Management Practices (BMPs). BMPs were designed to reduce the impacts of non-point source pollution during forestry, construction, agriculture and cultivation activities. BMPs include such things as buffers around water bodies to reduce the risk of siltation, building of water bars to slow the flow of water down hill, and placing culvert where streams have to be traversed. These BMPs will greatly reduce the amount of soil lost to runoff during heavy rain events and ensure the integrity of the construction site if followed properly.

Vehicular traffic associated with engineering and construction activities should remain on established roads to the maximum extent practicable. Previously disturbed routes and/or locations would be utilized during construction to the maximum extent practicable to reduce soil disturbances. Areas with highly erodible soils would be given special consideration to ensure incorporation of various compaction techniques, aggregate materials, wetting compounds, and revegetation to ameliorate the subsequent soil erosion. Erosion control measures such as waterbars, gabions, haybales, and reseeding would be implemented during and after construction activities. Revegetation efforts will be needed to ensure long-term recovery of the area and to prevent significant soil erosion problems. Native seeds and plants will be used to assist in the conservation and enhancement of protected species would be considered, as required by Section 7(a)(1) of the ESA.

6.2 Water Resources

The proposed RVS installations would not require SWPPP permits as part of the National Discharge Elimination System (NPDES) permit process. If jurisdictional wetlands are located within the ROI and are unavoidable, early coordination with the local USACE district, EPA, the county NRCS, and other appropriate agencies would be completed prior to the initiation of the construction activities. Applicable Section 404 permit procedures would be completed prior to any work in these areas. When identified, wetlands would be flagged, and silt fences and hay bales placed around the wetland to eliminate and impede any unnecessary impacts to the wetland areas.

6.3 Biological Resources

The Migratory Bird Treaty Act (MBTA) requires that Federal agencies coordinate with the USFWS if construction activity would result in the take of a migratory bird. If construction or clearing activities were scheduled during nesting seasons, surveys would be performed to identify active nests. If construction activities would result in the take of a migratory bird, then coordination with the USFWS and the state game and fish department and applicable permits would be obtained prior to construction or clearing activities. Another mitigation measure that would be considered is to schedule all construction activities outside the nesting season negating the requirement for nesting bird surveys. The proposed RVS systems would also comply with USFWS guidelines for reducing fatal bird strikes on communication towers. These guidelines recommend co-locating new antennae arrays on existing towers whenever possible and to build towers as short as possible without guy wires or lighting and use white strobe lights whenever lights are necessary for aviation safety.

Local threatened and endangered species lists and critical habitat information should be obtained from the USFWS Regional offices and the appropriate state agencies for each abbreviated EA. Species and habitat surveys should be performed in the proposed project areas, if needed, to determine whether any species or habitat may be detrimentally effected (See Section 3.5 for more information).

6.4 Cultural Resources

Prior to any ground disturbing activity, particularly construction of RVS towers or poles, consultation will be initiated with the SHPO and/or THPO. Site records checks and archaeological surveys will be conducted at each site in order to determine if there are any cultural resources that will be impacted during construction. If significant cultural resources are discovered within the area to be impacted, the appropriate mitigation measures would be implemented to minimize the impacts to those resources. These mitigation measures would be developed in consultation with the appropriate SHPO and/or THPO along with other interested parties. The preferred mitigation measure would be avoidance if possible.

In areas where the RVS equipment will be mounted on buildings, the building to be impacted would need to be evaluated for historic significance if it is 50 years old or older or a Cold War Era building. If the building is found to be historically, or architecturally significant and eligible for listing in the NRHP then appropriate mitigation measures would be developed in consultation with the appropriate SHPO and/or THPO along with other interested parties. The preferred mitigation measure would be avoidance if possible.

All sites would be assessed for visual impacts to any cultural resources within eyesight of the new construction and/or equipment. If there is a potential for significant visual impacts to cultural resources, particularly structures and/or historic districts, then a viewshed analysis would be appropriate in order to determine the extent of the visual impacts if any.

Through all levels of the Section 106 and NEPA process, consultation will be conducted with the appropriate Federally recognized tribes that claim a cultural affinity to the impacted area. These consultations could take the form of formal consultation letters, reviews of the NEPA documents, and reviews of the cultural resources survey reports for the appropriate projects. The construction of RVS poles and towers can be further expedited through the establishment of Programmatic Agreements (PAs) with the appropriate Native American tribes outlining the types of projects and conditions in which direct consultation would be appropriate. These PAs would be developed in accordance with appropriate Federal laws regarding Native American consultation between the Federal Entity and the Native American Tribes.

SECTION 7.0
PUBLIC INVOLVEMENT

7.0 PUBLIC INVOLVEMENT

7.1 Agency Coordination

This chapter discusses consultation and coordination that has occurred during preparation of the draft and final versions of this document. This includes contacts that were made during the development of the proposed action and writing of the PEA. Formal and informal coordination was conducted with the following agencies:

- Montana Natural Heritage Program
- Montana Department of Environmental Quality
- Montana Department of Natural Resources and Conservation
- Montana Fish, Wildlife, and Parks
- North Dakota Game and Fish Department
- North Dakota Natural Heritage Program
- North Dakota Department of Health
- North Dakota State Water Commission
- Minnesota Department of Natural Resources
- Minnesota Department of Environmental Quality
- Wisconsin Bureau of Endangered Resources
- Wisconsin Department of Natural Resources
- New Mexico Natural Heritage Program
- New Mexico Environment Department
- New Mexico Game and Fish Department
- Texas Parks and Wildlife Department
- Texas Water Development Board
- Texas Natural Resource Conservation Commission
- U.S. Fish and Wildlife Service (USFWS) Regional Offices
- Natural Resource Conservation Service (NRCS) State Offices
- Environmental Protection Agency (EPA) Regions 5, 6, and 8
- International Boundary and Water Commission
- Federally Recognized Native American Tribes
- State Historic Preservation Offices

7.2 Public Review

The Notice of Availability (NOA) will be published in local newspapers and the Draft PEA will be made available for public review for a period of 30 days. Comments will be incorporated into the Final PEA as well as included as an appendix. Proof of publication of the NOA for the Draft PEA will also be included as appendices.

SECTION 8.0
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8.0 REFERENCES

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SECTION 9.0
LIST OF PREPARERS

9.0 LIST OF PREPARERS

The following people were primarily responsible for preparing this Programmatic Environmental Assessment.

NAME	ORGANIZATION	DISCIPLINE/ EXPERTISE	EXPERIENCE	ROLE IN PREPARING EIS
Chris Ingram	Gulf South Research Corporation	Biology/Ecology	22 years NEPA and related studies	Scoping Process and PEA Review
Suna Knaus	Gulf South Research Corporation	Forestry and Wildlife	14 years NEPA and related studies	PEA Review
Patience Patterson	USACE, Ft. Worth District	Archaeology	29 years Professional Archaeologist/Cultural Resource Manager	PEA Review and coordination
Eric Verwers	INS A-E Resource Center	Biology	14 years in NEPA and related studies	Program manager and EA review and coordination
Charles McGregor	USACE, Ft. Worth District	Chemistry	5 years technical review of NEPA documents	Technical manager, SEA review and coordination
Frederick Olison	INS Administrative Center Dallas	Environmental Engineering	9 years NEPA and other environmental studies	Scoping Process and PEA Review and recommend for approval
John Lindemuth	Gulf South Research Corporation	Archaeology/Project Archaeologist	8 years archaeological studies	Cultural resources and socioeconomics
Sharon Newman	Gulf South Research Corporation	GIS/Graphics	8 years GIS analysis	Graphics and GIS
Kate Koske	Gulf South Research Corporation	Forestry/Wildlife	2 years in NEPA and related studies	T & E Species, Critical Habitat, and Water Resources
Mike Schulze	Gulf South Research Corporation	Environmental Studies	4 years natural resource and NEPA Studies	Project Manager, Alternative Formulation, Cumulative Impacts, Agency Coordination, and Noise
Jason Knowles	Gulf South Research Corporation	Geographic Information Systems	2 years Data/Theme development, Cartographic analysis.	GIS and Graphics

List of Prepares (Continued)

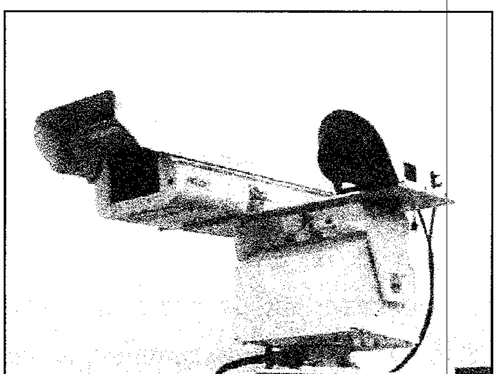
NAME	ORGANIZATION	DISCIPLINE/ EXPERTISE	EXPERIENCE	ROLE IN PREPARING EIS
Brad Yarbrough	Gulf South Research Corporation	Forestry/Wildlife	2 years of natural resources	Wetlands/Waters of the U.S. and Soils
Donna Bankston	Gulf South Research Corporation	Forest Management	1 year NEPA and related studies	Wildlife and Air Quality
Josh McEnany	Gulf South Research Corporation	Forestry/Wildlife	1 year in NEPA and related studies	Vegetation and Unique and Sensitive Areas

APPENDIX A
STANDARD DESIGNS FOR RVS SYSTEMS

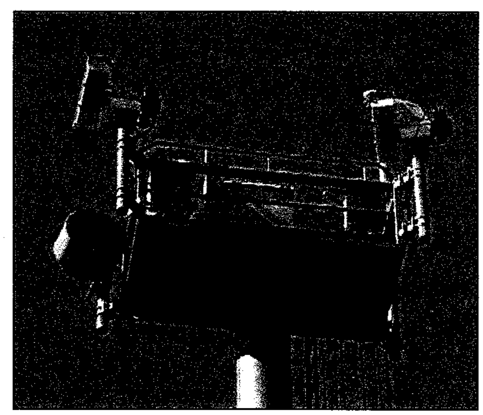
1.0 Standard Designs for RVS Systems

Previous NEPA documents and engineering drawings of existing RVS systems were reviewed in order to determine standard designs of existing RVS systems. RVS systems utilized by the USBP can either be pole mounted, tower mounted, co-located with existing towers, or mounted on existing buildings. A brief description of the standard designs common to existing RVS systems is given in the following subsections.

1.1 Standard Design for Pole Mounted RVS Systems



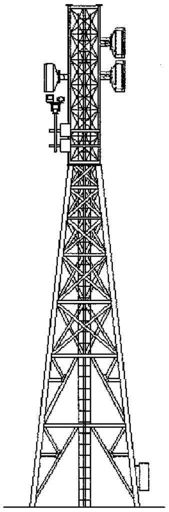
The standard design for pole mounted RVS systems would consist of multiple color cameras (low-light and infrared) and transmitters to send the signals back to the USBP Stations. An example of an RVS camera is shown in the picture to the left. The cameras used by RVS systems are similar to those used in Automatic Teller Machines (ATMs), stadiums, casinos, banks, and law enforcement agencies. This equipment would be mounted approximately 40-80 feet above ground level, depending upon the local terrain and surrounding development. The equipment is mounted on a rectangular or triangular platform that holds the microwave and antennae systems, cameras mounted on pan-and-tilt pedestals and control equipment. An example of a rectangular platform with all the RVS equipment mounted is shown in the picture to the right. The exact number and types of equipment depend on the number and types of cameras used, area to be monitored, UDA traffic, and other design variables. In addition, one or more small solid parabolic antennas are mounted on the platform railings or on a separate antenna mount depending upon several design variables. The antennas are used to transmit signals between RVS systems and ultimately to a USBP command center. The equipment would be mounted on steel or concrete poles that are approximately three feet in diameter. Typical pole placement requires a foundation that is an approximately 4-ft. in



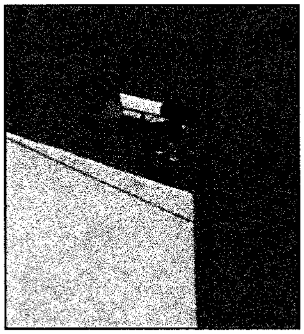
diameter by 12-ft. deep hole drilled by an auger, but the design is dependent upon subterranean characteristics determined by subsurface investigations. Concrete is placed in the hole and around the pole forming a concrete pad approximately 36 square feet (ft^2) (6 ft X 6 ft) at each site, to anchor the pole in the ground. An overview of a pole mounted RVS system is shown in the picture to the right. Power to the RVS systems are generally supplied via aerial lines from adjacent grids, small generators with batteries, or by solar power depending on the location. RVS systems, which utilize power from adjacent grids, are generally constructed within an area of 20 feet X 20 feet (400 ft^2). Solar powered RVS systems require a slightly larger area, approximately 30 ft X 30 ft (900 ft^2) in order to accommodate the solar panels, equipment, and a backup power source. An example of a typical setup for a solar powered RVS system is shown in the picture to the left.

1.2 Standard Design for RVS Towers

The standard design for the RVS towers would be a steel, three-legged tower that is 80 to 200 feet high, depending upon the location of the tower. An example of a tower mounted RVS system is shown in the drawing to the left. The cameras would be installed at a height that would ensure a satisfactory view and provide a clear pathway for transmission of information to relay stations and/or the USBP station. Three circular concrete pilings, approximately three feet in diameter, would be poured at each site to anchor the tower legs in the ground. The towers and associated facilities would occupy an area of 900 ft^2 (30 ft X 30 ft). Crushed stone is generally placed where there is no concrete and an 8-foot chain link fence is commonly used to enclose the area. Power to the RVS equipment would be supplied via aerial or underground lines from adjacent electrical grids.



1.3 Building Mounted and Co-located RVS systems



RVS components can also be installed on top of existing structures such as buildings, water towers, billboards, railroad bridges, or any structures within proximity of the area requiring surveillance. An example on a RVS system mounted on a building is shown in the pictures on the left and the right. In addition, RVS systems can be co-located on existing radio and communication towers. The use of existing buildings and co-location with other towers negates the need for ground disturbing activities, provided an existing power source could be utilized.

1.4 Operation and Maintenance Effects

The RVS equipment would require very little maintenance activities. Any such activities would be mostly limited to technology-based maintenance, and therefore, would not have any significant adverse impacts to the natural or human environment.

RVS systems transmit signals in line-of-sight between two given points. Unlike cellular and satellite systems, microwaves do not travel outside of a very narrow beam width and therefore would not be received by anything other than another RVS system. Frequencies by which RVS towers transmit signals are regulated and licensed by the Federal Communications Commission (FCC). All RVS systems would be in full compliance with FCC regulations and operate within frequencies assigned specifically to government agencies; therefore, local transmissions (i.e., television, radio, and cable) would not be affected by the transmission signals relayed between the RVS systems and the USBP control centers.

APPENDIX B
LIST OF COMMON/SCIENTIFIC NAMES

Appendix B - List of Common/Scientific Names (INS Central Region Land Border)

PLANTS

Black grama/*Bouteloua eriopoda*
Black mangrove/*Avicennia germinans*
Bull nettle/*Cnidoscolus texanus*
Cattail/*Typha* spp.
Common reed/*Phragmites communis*
Creosotebush/*Larrea tridentata*
Dayflower/*Commelina* spp.
Duckweed/*Lemna* spp.
Field ragweed/*Ambrosia confertiflora*
Flatsedge/*Cyperus* spp.
Gray oak/*Quercus grisea*
Live oak/*Quercus virginiana*
Lotebush/*Ziziphus obtusifolia*
Mesquite/*Prosopis glandulosa*
Pink pappusgrass/*Pappophorum bicolor*
Pinyon pine/*Pinus cembroides*
Saltcedar /*Tamarix* spp.
Sandsage/*Artemisia filifolia*
Sea rocket/*Cakile fusiformis*
Texas pricklypear/*Opuntia lindheimeri*
Texas sage/*Leucophyllum frutescens*
Tobosa/*Hilaria mutica*
Whitebush/*Aloysia gratissima*
Yaupon/*Ilex vomitoria*
Yucca/*Yucca* spp.

BIRDS

Bank swallow/*Riparia riparia*
Belted kingfisher/*Ceryle alcyon*
Black-throated sparrow/*Amphispiza belli*
Blue jay/*Cyanocitta cristata*
Cerulean warbler/*Dendroica cerulea*
Chestnut-backed chickadees/*Poecile rufescens*
Chihuahuan raven/*Corvus cryptoleucus*
Curved-billed thrasher/*Toxostoma curvirostre*
Cerulean warbler/*Dendroica cerulea*
Chihuahuan raven/*Corvus cryptoleucus*
Eastern meadowlark/*Sturnella magna*
Ferruginous hawk/ *Buteo regalis*
Gambel's quail/*Callipepla gambelii*
Golden eagle/*Aquila chrysaetos*
Great gray owl/ *Strix Nebulosa*
Green-backed heron/*Butorides straitus*
Horned lark/*Eremophila alpestris*
Lark bunting/*Calamospiza melanocorys*

Mourning dove/*Zenaida macroura*
Northern juncos/ *Junco hyemalis*
Ovenbird/*Seiurus aurocapillus*
Ptarmigan/ *Lagopus leucurus*
Red-breasted nuthatch/*Sita canadensis*
Red-tailed hawk/*Buteo jamaicensis*
Rose-breasted grosbeak/*Pheucticus ludovicianus*
Sage grouse/ *Centrocercus urophasianus*
Scaled quail/*Callipepla squamata*
Scarlet tanager/*Piranga olivacea*
Sharp-tailed grouse/ *Tympanuchus phasianellus*
Spotted sandpiper/*Actitis macularia*
Western meadowlark/*Sturnella neglecta*
White-throated sparrow/*Zonotrichia albicollis*
Wild turkey/*Meleagris gallopavo*
Yellow-bellied sapsucker/*Sphyrapicus varius*

MAMMALS
American badger/*Taxidea taxus*
American buffalo/ *Bison bison*
American marten/ *Martes Americana*
Armadillo/*Dasypus bellus*
Beaver/ *Castor canadensis*
Black bear/*Urus americanus*
Black-tailed jackrabbit/*Lepus californicus*
Black-tailed prairie dog/*Cynomys ludovicianus*
Bobcat/*Lynx rufus*
Bobwhite quail/ *Colinus virginianus*
Bushytail woodrat/ *Neotoma cinerea*
Collared peccary (Javelina)/*Tayassu tajacu*
Coyote/*Canis latrans*
Desert cottontail/*Sylvilagus audubonii*
Eastern chipmunk/ *Tamias striatus*
Eastern fox squirrel/*Sciurus niger*
Elk/ *Cervus Elaphus*
Flying squirrel/ *Glaucomys sabrinus*
Ground squirrel/ *Spemophilus parryii*
Gulf Coast kangaroo rat/*Dipodomys compactus*
Javelina/ *Tayassu tajacu*
Lagomorphs/ *Sylvilagus audubonii vallicola*
Marmot/ *Marmota flaviventris*
Mexican freetail bat/ *Tadarida brasiliensis mexicana*
Mexican ground squirrel/*Spermophilus mexicanus*
Mexican woodrat/*Neotoma mexicana*
Mink/ *Mustela vison*
Mountain goat/ *Oreamnos americanus*
Mountain lion/ *Felis concolor*
Mule deer/*Odocoileus hemionus*
Pronghorn/*Antilocapra Americana*
Muskrat/ *Ondatra zibethicus*
Pocket gopher/ *Thomomys talpoides*

Raccoon/ *Procyon lotor*
Red-tailed Chipmunk/ *Tamias ruficaudus*
Ringtail/*Bassariscus astutus*
River otter/ *Lutra canadensis*
Striped skunk/*Mephitis mephiti*
Short tail weasel/ *Mustela erminea*
Snowshoe hare/ *Lepus americanus*
Thirteen-lined ground squirrel/ *Spermophilus tridecemlineatus*
White-tailed deer/*Odocoileus virginianus*
Whitetail jackrabbit/ *Lepus townsendi*

APPENDIX C
NRHP LISTED PROPERTIES WITHIN THE ROI

Appendix C: NRHP Listed Properties within the ROI

NRHP Listed Property	County
Blaine County, Montana	
Chief Joseph Battleground of the Bear's Paw	Chinook
Dave's Texaco	Chinook
Lodgepole Community Hall	Lodgepole
Lohman Block	Chinook
Scherlie, Anna, Homestead Shack	Turner
Young Brothers Chevrolet Garage	Chinook
Flathead, Montana	
Adair, W. L., General Mercantile Historic District	Polebridge
Alexander and Busey Houses	Kalispell
Anderson Style Shop	Kalispell
Apgar Fire Lookout	West Glacier
Bader--Jaquette and Westwang Houses and Rental Property	Kalispell
Beaman House	Kalispell
Belly River Ranger Station Historic District	West Glacier
Belton Chalets	West Glacier
Billsborough House	Kalispell
Bowman Lake Patrol Cabin	West Glacier
Bowman Lake Road	West Glacier
Boyd's Shop	Kalispell
Brice Apartments	Kalispell
Bull Head Lodge and Studio	Apgar
Cattle Queen Snowshoe Cabin	West Glacier
City Water Department	Kalispell
Coal Creek Patrol Cabin	West Glacier
Conrad, Charles E., Mansion	Kalispell
Continental Oil Company Filling Station	Kalispell
Continental Oil Company Warehouse and Garage	Kalispell
Cornelius Hedges Elementary School	Kalispell
Courthouse Historic District	Kalispell
Dean, A. J., House	Kalispell
East Glacier Ranger Station Historic District	West Glacier
East Side Historic District	Kalispell
Equity Supply Company Elevator and Creamery	Kalispell
Federal Building	Kalispell
Ferguson House	Kalispell
Fielding Snowshoe Patrol Cabin	West Glacier
Fish Creek Bay Boathouse	West Glacier
Fisher House	Kalispell
Flathead Wholesale Grocery	Kalispell
Ford Creek Patrol Cabin	West Glacier
Gay, Edward, House	Kalispell
Gibson--Lebert House	Kalispell

NRHP Listed Property	County
Going-to-the-Sun Road	West Glacier
Going-to-the-Sun Road	West Glacier
Graham House	Kalispell
Granite Park Chalet	West Glacier
Great Northern Railway Buildings	Glacier National Park
Great Northern Railway Buildings	Glacier National Park
Great Northern Railway Depot	Kalispell
Gregg--Moses House	Kalispell
Gunsight Pass Shelter	West Glacier
Harrison Lake Patrol Cabin	Glacier National Park
Headquarters Historic District	West Glacier
Heaven's Peak Fire Lookout	West Glacier
Heller Building	Kalispell
Hodgson House	Kalispell
Hornet Lookout	Flathead National Forest
Hotel Norden	Kalispell
Houtz House	Kalispell
Huckleberry Fire Outlook	West Glacier
Izaak Walton Inn	Essex
Johnson--Lee House	Kalispell
Kalispell Flour Mill	Kalispell
Kalispell Monumental Company	Kalispell
Kalispell--American Laundry	Kalispell
Kearney Rapids Bridge	Bigfork
Keith, Harry C., House	Kalispell
Kerr House	Kalispell
Kintla Lake Ranger Station	West Glacier
Kishenehn Ranger Station Historic District	West Glacier
Lake McDonald Lodge Historic District	West Glacier
Lake McDonald Lodge Historic District	West Glacier
Leibig House	Kalispell
Lewis Glacier Hotel	West Glacier
Lincoln Creek Snowshoe Cabin	Glacier National Park, W. Glacier
Logan Creek Patrol Cabin	West Glacier
Logging Creek Ranger Station Historic District	West Glacier
Loneman Fire Lookout	West Glacier
Long House	Kalispell
Lower Logging Lake Snowshoe Cabin and Boathouse	West Glacier
Lower Nyack Snowshoe Cabin	West Glacier
Lower Park Creek Patrol Cabin	West Glacier
Main Street Commercial Historic District	Kalispell
McCarthy Homestead Cabin	West Glacier
McCarthy, Margaret, Homestead	Big Prairie
McGee House	Kalispell
McMannamy House and Rental Properties	Kalispell

NRHP Listed Property	County
Miller, J. K., Homestead	Big Prairie
Mount Brown Fire Lookout	West Glacier
North Fork Road	West Glacier
Norwegian Evangelical Lutheran Church and Parsonage	Kalispell
Numa Ridge Fire Lookout	West Glacier
Nyack Ranger Station Historic District	West Glacier
O'Neil Lumber Company Office	Kalispell
Pass Creek Snowshoe Cabin	West Glacier
Polebridge Ranger Station Historic District	West Glacier
Polebridge to Numa Ridge Phoneline	West Glacier
Porter Ranch Barn	Kalispell
Ptarmigan Tunnel	West Glacier
Quartz Lake Patrol Cabin	West Glacier
Raftery, William, Homestead	Big Prairie
Reid--Kent House	Kalispell
Ringleberg, Cornelius, House	Kalispell
Rogers House	Kalispell
Roose--Eckelberry House	Kalispell
Russell School	Kalispell
Saint Mary Ranger Station	West Glacier
Sauser--Mercord Building	Kalispell
Scalplock Mountain Fire Lookout	West Glacier
Scandinavian Methodist Church	Kalispell
Schoenberger, Anton, Homestead	Big Prairie
Schoenberger, Charlie, Homestead	Big Prairie
Scott--Forhan House	Kalispell
Sherburne Ranger Station Historic District	West Glacier
Skyland Camp--Bowman Lake Ranger Station	West Glacier
Slide Lake-Otatso Creek Patrol Cabin and Woodshed	West Glacier
Smith House	Kalispell
Snyder House	Kalispell
Soldiers' Home Historic District	Columbia Falls
Sperry Chalets	West Glacier
St. Richard's Church	Columbia Falls
Stillwater Ranger Station Historic District	Olney
Swiftcurrent Fire Lookout	West Glacier
Swiftcurrent Ranger Station Historic District	West Glacier
Taylor, Ray E., House	Whitefish
Thibodeau Electric Shop	Kalispell
Thierwechter House	Kalispell
Two Medicine General Store	West Glacier
Upper Kintla Lake Patrol Cabin	West Glacier
Upper Lake McDonald Ranger Station Historic District	West Glacier
Upper Logging Lake Snowshoe Cabin	West Glacier
Upper Nyack Snowshoe Cabin	West Glacier
Upper Park Creek Patrol Cabin	West Glacier

NRHP Listed Property	County
Vance Lodge	Polebridge
Waggener & Campbell Funeral Home	Kalispell
Walker House	Kalispell
Walsh's, Johnnie, Guest Lodge	Big Prairie
Walsh, Johnnie, Homestead	Big Prairie
Walsh, Thomas J., Lodge	Apgar
Walton Ranger Station Historic District	West Glacier
West Entrance Station	West Glacier
West Side Historic District	Kalispell
Wheeler, Burton and Lulu, Cabin	Apgar
Woll House	Kalispell
Wurtz Homestead	Polebridge
Glacier County, Montana	
Camp Disappointment	Browning
Cut Bank Ranger Station Historic District	East Glacier
Glacier National Park Tourist Trails--Inside Trail, South Circle, North Circle	St. Mary
Goathaunt Bunkhouse	St. Mary
Going-to-the-Sun Road	West Glacier
Going-to-the-Sun Road	West Glacier
Holy Family Mission	Browning
Kootenai Creek Snowshoe Cabin	St. Mary
Lee Creek Snowshoe Cabin	Glacier National Park
Many Glacier Barn and Bunkhouse	St. Mary
Many Glacier Campground Camptender's Cabin	St. Mary
Many Glacier Hotel Historic District	Babb
Rising Sun Auto Camp	St. Mary
Roes Creek Campground Camptender's Cabin	St. Mary
St. Mary Utility Area Historic District	St. Mary
Sun Camp Fireguard Cabin	St. Mary
Swanson Boathouse	East Glacier
Swiftcurrent Auto Camp Historic District	Many Glacier
Two Medicine Campground Camptender's Cabin	East Glacier
Toole County, Montana	
Bethany Lutheran Church	Oilmont
Kevin Depot	Kevin
Rainbow Conoco	Shelby
Rocky Springs Segment of the Whoop-Up Trail	Kevin
US Customs Building	Sweetgrass
Liberty County, Montana	
First Episcopal Methodist Church of Chester	Chester
First State Bank of Chester	Chester

NRHP Listed Property	County
Hill County, Montana	
Carnegie Public Library	Havre
Clack, H. Earl, House	Havre
Fort Assinniboine	Havre
Havre Residential Historic District	Havre
Heltne Oil Company	Havre
Too Close For Comfort Site (24HL101)	Havre
US Post Office and Courthouse--Havre Main	Havre
Young--Almas House	Havre
Blaine County, Montana	
Chief Joseph Battleground of the Bear's Paw	Chinook
Dave's Texaco	Chinook
Lodgepole Community Hall	Lodgepole
Lohman Block	Chinook
Scherlie, Anna, Homestead Shack	Turner
Young Brothers Chevrolet Garage	Chinook
Phillips County, Montana	
Clack, H. Earl, Service Station	Saco
Phillips County Carnegie Library	Malta
Saco Mercantile	Saco
Sleeping Buffalo Rock	Saco
Valley County, Montana	
Administration Building	Fort Peck
Employee's Hotel and Garage	Fort Peck
Fort Peck Dam	Fort Peck
Fort Peck Original Houses Historic District	Fort Peck
Fort Peck Theatre	Fort Peck
Garage and Fire Station	Fort Peck
Hospital	Fort Peck
Recreation Hall	Fort Peck
Sargent, Charles C., House	Nashua
US Post Office and Courthouse--Glasgow Main	Glasgow
Daniels County, Montana	
Daniels County Courthouse	Scobey
Daniels, Mansfield A., House	Scobey
Sheridan County, Montana	
Comertown Historic District	Westby
Larsen, Aage and Kristine, Homestead	Dagmar
Outlook Depot	Outlook
Raymond Grain Elevators Historic District	Raymond
Rocky Valley Lutheran Church	Dooley

NRHP Listed Property	County
Thornwood School	Reserve
Tipi Hills	Medicine Lake
Divide County, North Dakota	
Divide County Courthouse	Crosby
Nielsen, Niels, Fourteen-Side Barn Farm	Noonan
Burke County, North Dakota	
Burke County Courthouse	Bowbells
Portal State Bank	Portal
Renville County, North Dakota	
Mckinney Cemetery	Tolley
Renville County Courthouse	Mohall
Bottineau, North Dakota	
Crogen, Ole, Farm District	Carbury & Bottineau
State Bank of Antler	Antler
Towner County, North Dakota	
Towner County Courthouse	Cando
Cavalier County, North Dakota	
Roxy Theatre	Langdon
US Post Office--Langdon	Langdon
Pembina County, North Dakota	
Crystal Bridge	Crystal
Drayton United Methodist Church	Drayton
Gingras House and Trading Post	Walhalla
Grace Episcopal Church	Pembina
O'Connor House	St. Thomas
Pembina County Courthouse	Cavalier
US Customs House and Post Office--Pembina	Pembina
Kittson County, Minnesota	
Lake Bronson Site	Lake Bronson
Lake Bronson State Park WPA/Rustic Style Historic Resources	Lake Bronson
St. Nicholas Orthodox Church	Lancaster
Roseau County, Minnesota	
Canadian National Depot	Warroad
Roseau County Courthouse	Roseau
Lake of the Woods County, Minnesota	
Fort St. Charles Archeological Site	Angle Inlet

NRHP Listed Property	County
Norris Camp	Roosevelt
Northwest Point	Angle Inlet
Spooner Public School	Baudette
Koochiching County, Minnesota	
Bridge No. 5721	Silverdale
Finsted's Auto Marine Shop	Ranier
Gold Mine Sites	Island View
Koochiching County Courthouse	International Falls
Laurel Mounds	International Falls
Little American Mine	Island View
McKinstry Mounds and Village Site	International Falls
Nett Lake Petroglyphs Site	Orr
Oberholtzer, Ernest C., Rainy Lake Islands Historic District	Ranier
Sts. Peter and Paul Russian Orthodox Church	Bramble
White, Francis, Homestead	Littlefork
Carlton County, Minnesota	
Carlton County Courthouse	Carlton
Church of Sts. Joseph and Mary--Catholic	Cloquet
Cloquet City Hall	Cloquet
Cloquet-Northern Office Building	Cloquet
Cooke, Jay, State Park CCC/Rustic Style Historic District	Carlton
Cooke, Jay, State Park CCC/WPA/Rustic Style Picnic Grounds	Carlton
Cooke, Jay, State Park CCC/WPA/Rustic Style Service Yard	Carlton
Grand Portage of the St. Louis River	Duluth
Kalevala Finnish Evangelical National Lutheran Church	Kalevala Township
Lindholm Oil Company Service Station	Cloquet
Minneapolis, St. Paul, and Sault Ste. Marie Depot	Moose Lake
Northeastern Hotel	Cloquet
Park Place Historic District	Cloquet
Shaw Memorial Library	Cloquet
St. Louis County, Minnesota	
Aerial Lift Bridge	Duluth
Aho, Elias and Lisi, Historic Farmstead	Tower
Alango School	Cook
Anderson, Andrew G., House	Hibbing
Androy Hotel	Hibbing
Archaeological Site No. 21SL82	International Falls
Archeological Site 21SL141	International Falls
Archeological Site 21SL35	International Falls
Archeological Site 21SL55	International Falls
Archeological Site No. 21SL73	International Falls
B'nai Abraham Synagogue	Virginia
Bailey, W. T., House	Virginia

NRHP Listed Property	County
Bailey, W., House	Eveleth
Bridge No. 5757	Duluth
Bridge No. L6007	Duluth
Bruce Mine Headframe	Chisholm
Buhl Public Library	Buhl
Buhl Village Hall	Buhl
Bull-of-the-Woods Logging Scow	Morse Township
Burntside Lodge Historic District	Ely
Burntside Lodge Historic District	Ely
Burntside Lodge Historic District	Ely
Burntside Lodge Historic District	Ely
Burntside Lodge Historic District	Ely
Burntside Lodge Historic District	Ely
Burntside Lodge Historic District	Ely
Butler, Emmett, House	Hibbing
Chester Terrace	Duluth
Church of St. John the Baptist (Catholic)	Virginia
Church of the Holy Family (Catholic)	Eveleth
Civilian Conservation Corps Camp S-52	Orr
Coates House	Virginia
Congdon, Chester and Clara, Estate	Duluth
Delvic Building	Hibbing
DeWitt-Seitz Building	Duluth
Duluth Central High School	Duluth
Duluth Civic Center Historic District	Duluth
Duluth Missabe and Iron Range Depot (Endion)	Duluth
Duluth Public Library	Duluth
Duluth South Breakwater Inner (Duluth Range Rear) Lighthouse	Duluth
Duluth State Normal School Historic District	Duluth
Duluth Union Depot	Duluth
Duluth, Winnipeg, and Pacific Depot	Virginia
East Howard Street Commercial Historic District	Hibbing
Endion School	Duluth
Eveleth Manual Training Center	Eveleth
Eveleth Recreation Building	Eveleth
Finnish Sauna	Virginia
Fire House No. 1	Duluth
Fitger Brewing Company	Duluth
Fitger Brewing Company	Duluth
Flint Creek Farm Historic District	Cook
Fujita, Jun, Cabin	Ranier
Fujita, Jun, Cabin	Ranier
Hanka, Gregorius and Mary, Historic Farmstead	Tower
Hartley Building	Duluth
Hearding, John Harris, Grammar and High School and John A. Johnson Grammar School	Aurora

NRHP Listed Property	County
Height of Land Portage	Embarrass
Hibbing City Hall	Hibbing
Hibbing Disposal Plant	Hibbing
Hibbing High School	Hibbing
Hill, Matt and Emma, Historic Farmstead	Tower
Hotel Glode	Eveleth
Hull-Rust-Mahoning Open Pit Iron Mine	Hibbing
Irving School	Duluth
Jukola Boardinghouse	Virginia
Kabetogama Ranger Station District	Ray
Kettle Falls Historic District	Island View
Kettle Falls Hotel	Island View
Kitchi Gammi Club	Duluth
LeMoine Building	Orr
Lenont, Charles, House	Virginia
Lincoln School Building	Virginia
Longyear, E. J., First Diamond Drill Site	Hoyt Lake
Matson, Mike and Mary, Historic Farmstead	Tower
Minnesota Point Lighthouse	Duluth
Mitchell-Tappan House	Hibbing
Moe, Bergetta, Bakery	Duluth
Mountain Iron Mine	Mountain Iron
Mountain Iron Mine	Mountain Iron
Munger Terrace	Duluth
Nelimark, Erick and Kristina, Sauna	Tower
Northland	Proctor
Pioneer Mine Buildings and A Headframe	Ely
Sacred Heart Cathedral and Cathedral School	Duluth
Saints Peter and Paul Church--Ukranian Catholic	Chisholm
Seitaniemi, Alex, Housebarn	Tower
Sons of Italy Hall	Hibbing
Soudan Iron Mine	Tower
Soudan Iron Mine	Tower
St. Louis County 4-H Club Camp	Gilbert
St. Mark's African Methodist Episcopal Church	Duluth
St.Louis County District Courthouse	Virginia
Tanner's Hospital	Ely
Tanttari, Waino, Field Hay Barn	Tower
THOMAS WILSON (Whaleback Freighter) Shipwreck	Duluth
Tower Fire Hall	Tower
Traphagen, Oliver G., House	Duluth
United States Army Corps of Engineers Duluth Vessel Yard	Duluth
US Fisheries Station, Duluth	Duluth
USS ESSEX Shipwreck Site	Duluth
Valon Tuote Raittiusseura	Virginia
Virginia Brewery	Virginia

NRHP Listed Property	County
Virginia Commercial Historic District	Virginia
Virginia Recreation Building	Virginia
Virginia-Rainy Lake Lumber Company Manager's Residence	Virginia
Virginia-Rainy Lake Lumber Company Office	Virginia
Western Bohemian Fraternal Union Hall	Meadowlands
WILLIAM A. IRVIN (freighter)	Duluth
Wirth Building	Duluth
Lake County, Minnesota	
Bridge No. 3589--Silver Creek Township	Silver Creek Township
Duluth and Iron Range Railroad Company Depot	Two Harbors
Dwan, John, Office Building	Two Harbors
EDNA G (tugboat)	Two Harbors
Gooseberry Falls State Park CCC/WPA/Rustic Style Historic Resources	Two Harbors
HESPER Shipwreck Site	Silver Bay
Lake County Courthouse and Sheriff's Residence	Two Harbors
Larsmont School	Two Harbors
MADEIRA (Schooner--Barge) Shipwreck	Beaver Bay
Mattson, Edward and Lisa, House and Fish House	East Beaver Bay
NIAGARA Shipwreck Site	Knife River
ONOKO (Bulk Freight Steamer) Shipwreck	Knife River
SAMUEL P. ELY Shipwreck	Two Harbors
Split Rock Lighthouse	Two Harbors
Split Rock Lighthouse	Two Harbors
Tettegouche Camp Historic District	Silver Bay
Two Harbors Carnegie Library	Two Harbors
Two Harbors Light Station	Two Harbors
Cook County, Minnesota	
AMBOY and GEORGE SPENCER Shipwreck Sites	Schroeder
Bally Blacksmith Shop	Grand Marais
Church of St. Francis Xavier--Catholic	Grand Marais
Clearwater Lodge	Grand Marais
Cook County Courthouse	Grand Marais
Fowl Lake Site	Hovland
Grand Portage National Monument	Grand Marais
Height of Land	Grand Marais
Lightkeeper's House	Grand Marais
Naniboujou Club Lodge	Grand Marais
Schroeder Lumber Company Bunkhouse	Schroeder
Scott, Jim, Fishhouse	Grand Marais
Douglas County, Wisconsin	
Berkshire Block	Superior
Brule-St. Croix Portage	Solon Springs

NRHP Listed Property	**County**
Davidson Windmill	Superior
Douglas County Courthouse	Superior
Empire Block	Superior
Lake Nebagamon Auditorium	Lake Nebagamon
Maryland Block	Superior
Massachusetts Block	Superior
METEOR (Whaleback carrier)	Superior
Minnesota Block-Board of Trade Bldg.	Superior
New Jersey Building	Superior
New York Block	Superior
Northern Block	Superior
Pattison, Martin, House	Superior
Trade and Commerce Building	Superior
Washington Block	Superior
Wemyss Building	Superior
Bayfield County, Wisconsin	
Bank of Washburn	Washburn
Bayfield County Courthouse	Washburn
Bayfield Fish Hatchery	Salmo
Bayfield Historic District	Bayfield
Booth Cooperage	Bayfield
Boutin, Frank, Jr., House	Bayfield
Christ Episcopal Church	Bayfield
Herbster Community Center	Herbster
Hokenson Fishing Dock	Bayfield
Island Lake Camp	Drummond
Old Bayfield County Courthouse	Bayfield
OTTAWA (Tug) Shipwreck Site	Russell
Pureair Sanatorium	Bayfield
SEVONA (Bulk Carrier) Shipwreck Site	Bayfield
Sevona Cabin	Bayfield
Shaw Farm	Bayfield
Washburn Public Library	Washburn
Ashland County, Wisconsin	
Apostle Islands Lighthouses	Bayfield
Apostle Islands Lighthouses	Bayfield
Apostle Islands Lighthouses	Bayfield
Apostle Islands Lighthouses	Bayfield
Apostle Islands Lighthouses	Bayfield
Apostle Islands Lighthouses	Bayfield
Apostle Islands Lighthouses	Bayfield
Ashland County Courthouse	Ashland
Ashland Middle School	Ashland
Bass Island Brownstone Company Quarry	La Pointe

NRHP Listed Property	County
Beaser School	Ashland
Ellis School	Ashland
Hadland Fishing Camp	La Pointe
La Pointe Indian Cemetery	La Pointe
La Pointe Light Station	Bayfield
LaPointe Indian Cemetery	LaPointe
LUCERNE (Shipwreck)	La Pointe
Manitou Camp	Apostle Islands National Lakeshore
Marina Site	La Pointe
Marion Park Pavilion	Glidden
Mellen City Hall	Ashland
Memorial Hall	Ashland
Morty Site (47AS40)	Bayfield
NOQUEBAY (Schooner--Barge) Shipwreck Site	La Pointe
Old Ashland Post Office	Ashland
P-Flat Site (47AS47)	Bayfield
PRETORIA (schooner--barge) Shipwreck Site	Bayfield
R. G. STEWART (Shipwreck)	La Pointe
Security Savings Bank	Ashland
Soo Line Depot	Ashland
Trout Point Logging Camp	Bayfield
Union Depot	Ashland
Wakefield Hall	Ashland
West Second Street Historic District	Ashland
Wheeler Hall, Northland College	Ashland
Wilmarth School	Ashland
Iron County, Wisconsin	
Annala Round Barn	Hurley
Montreal Company Location Historic District	Montreal
Old Iron County Courthouse	Hurley
Plummer Mine Headframe	Pence
Springstead	Sherman
Hidalgo County, New Mexico	
Alamo Hueco Site	Animas
Archeological Site No. LA 54021	Animas
Archeological Site No. LA 54042	Animas
Archeological Site No. LA 54049	Animas
Archeological Site No. LA 54050	Animas
Box Canyon Site	Animas
Brushy Creek Ruin	Animas
Clanton Draw Site	Animas
Culberson Ruin	Animas
Double Adobe Creek Site	Animas

NRHP Listed Property	County
Fortress--Stewart Ranch Site	Animas
Hidalgo County Courthouse	Lordsburg
Hoskins Site	Animas
Joyce Well Site	Animas
Little Site	Animas
Lunch Box Site	Animas
Metate Ruin	Animas
Pendleton Ruin	Animas
Pigpen Creek Site	Animas
Saddle Bronc--Battleground Site	Animas
Shakespeare Ghost Town	Lordsburg
Sycamore Well Site	Animas
Timberlake Ruin--Walnut Creek Site	Animas
Luna County, New Mexico	
Deming Armory	Deming
Field, Seaman, House	Deming
Luna County Courthouse and Park	Deming
Mahoney Building	Deming
Upton Site	Deming
US Post Office--Deming Main	Deming
Village of Columbus and Camp Furlong	Columbus
Dona Ana County, New Mexico	
Air Science	Las Cruces
Alameda-Depot Historic District	Las Cruces
Armijo, Nestor, House	Las Cruces
Barela-Reynolds House	Mesilla
Dona Ana Village Historic District	Dona Ana
Elephant Butte Irrigation District	Las Cruces
Fort Fillmore	Las Cruces
Fort Selden	Las Cruces
Foster Hall	Las Cruces
Goddard Hall	Las Cruces
Hadley--Ludwick House	Las Cruces
International Boundary Marker No. 1, U.S. and Mexico	El Paso
La Mesilla Historic District	La Mesilla
Launch Complex 33	White Sands Missile Range
Mesilla Plaza	Las Cruces
Mesquite Street Original Townsite Historic District	Las Cruces
Our Lady of Purication Catholic Church	Dona Ana
Rio Grande Bridge at Radium Springs	Radium Springs
San Jose Church	La Mesa
University President's House	Las Cruces
El Paso County, Texas	

NRHP Listed Property	**County**
1800's Mexican Consulate	El Paso
Abdou Building	El Paso
Bassett, O. T., Tower	El Paso
Caples, Richard, Building	El Paso
Castner Range Archeological District	El Paso
Chamizal National Memorial	El Paso
Doyle, Sgt., Site	El Paso
El Paso County Water Improvement District No. 1	El Paso
El Paso High School	El Paso
El Paso Union Passenger Station	El Paso
El Paso US Courthouse	El Paso
First Mortage Company Building	El Paso
Fort Bliss Main Post Historic District	El Paso
Franklin Canal	El Paso
Fusselman Canyon Rock Art District	El Paso
Hills, W. S., Commercial Structure	El Paso
Hot Well Archeological Site	El Paso
Hotel Cortez	El Paso
Hotel Paso del Norte	El Paso
Hueco Tanks	El Paso
Magoffin Homestead	El Paso
Manhattan Heights Historic District	El Paso
Martin Building	El Paso
Mission Socorro Archeological Site	Socorro
Newberry, J. J., Company	El Paso
Northgate Site	El Paso
Old Bnai Zion Synagogue	El Paso
Old Fort Bliss	El Paso
Old San Francisco Historic District	El Paso
Palace Theatre	El Paso
Plaza Hotel	El Paso
Plaza Theatre	El Paso
Popular Department Store	El Paso
Presidio Chapel of San Elizario	San Elizario
Quarters Number 1	Fort Bliss
Rio Grande Avenue Historic District	El Paso
Rio Vista Farm Historic District	Socorro
Roberts-Banner Building	El Paso
San Elizario Historic District	San Elizario
Silver Dollar Cafe	El Paso
Singer Sewing Company	El Paso
Socorro Mission	Socorro
State National Bank	El Paso
Sunset Heights Historic District	El Paso
Toltec Club	El Paso
Trost, Henry C., House	El Paso

NRHP Listed Property	County
U.S. Post Office	El Paso
White House Department Store and Hotel McCoy	El Paso
Women's Club	El Paso
Ysleta Mission	Ysleta

Hudspeth County, Texas

Alamo Canyon--Wilkey Ranch Discontiguous Archeological District	Fort Hancock
Archeological Site No. 41 HZ 1	Sierra Blanca
Archeological Site No. 41 HZ 181	Sierra Blanca
Archeological Site No. 41 HZ 182	Sierra Blanca
Archeological Site No. 41 HZ 183	Sierra Blanca
Archeological Site No. 41 HZ 184	Sierra Blanca
Archeological Site No. 41 HZ 190	Sierra Blanca
Archeological Site No. 41 HZ 200	Sierra Blanca
Archeological Site No. 41 HZ 220	Sierra Blanca
Archeological Site No. 41 HZ 227	Sierra Blanca
Archeological Site No. 41 HZ 228	Sierra Blanca
Archeological Site No. 41 HZ 283	Sierra Blanca
Archeological Site No. 41 HZ 284	Sierra Blanca
Archeological Site No. 41 HZ 285	Sierra Blanca
Archeological Site No. 41 HZ 286	Sierra Blanca
Archeological Site No. 41 HZ 287	Sierra Blanca
Archeological Site No. 41 HZ 288	Sierra Blanca
Archeological Site No. 41 HZ 289	Sierra Blanca
Archeological Site No. 41 HZ 290	Sierra Blanca
Archeological Site No. 41 HZ 291	Sierra Blanca
Archeological Site No. 41 HZ 292	Sierra Blanca
Archeological Site No. 41 HZ 293	Sierra Blanca
Archeological Site No. 41 HZ 294	Sierra Blanca
Archeological Site No. 41 HZ 295	Sierra Blanca
Archeological Site No. 41 HZ 296	Sierra Blanca
Archeological Site No. 41 HZ 297	Sierra Blanca
Archeological Site No. 41 HZ 298	Sierra Blanca
Archeological Site No. 41 HZ 299	Sierra Blanca
Archeological Site No. 41 HZ 300	Sierra Blanca
Archeological Site No. 41 HZ 301	Sierra Blanca
Archeological Site No. 41 HZ 302	Sierra Blanca
Archeological Site No. 41 HZ 303	Sierra Blanca
Archeological Site No. 41 HZ 304--305	Sierra Blanca
Archeological Site No. 41 HZ 306	Sierra Blanca
Archeological Site No. 41 HZ 307	Sierra Blanca
Archeological Site No. 41 HZ 308	Sierra Blanca
Archeological Site No. 41 HZ 309	Sierra Blanca
Archeological Site No. 41 HZ 311	Sierra Blanca
Archeological Site No. 41 HZ 312	Sierra Blanca

NRHP Listed Property	County
Archeological Site No. 41 HZ 313	Sierra Blanca
Archeological Site No. 41 HZ 339	Sierra Blanca
Archeological Site No. 41 HZ 340	Sierra Blanca
Archeological Site No. 41 HZ 409	Sierra Blanca
Archeological Site No. 41 HZ 410	Sierra Blanca
Archeological Site No. 41 HZ 411	Sierra Blanca
Archeological Site No. 41 HZ 412	Sierra Blanca
Archeological Site No. 41 HZ 413	Sierra Blanca
Archeological Site No. 41 HZ 414	Sierra Blanca
Archeological Site No. 41 HZ 415	Sierra Blanca
Archeological Site No. 41 HZ 416	Sierra Blanca
Archeological Site No. 41 HZ 417	Sierra Blanca
Archeological Site No. 41 HZ 418	Sierra Blanca
Archeological Site No. 41 HZ 419	Sierra Blanca
Archeological Site No. 41 HZ 420	Sierra Blanca
Archeological Site No. 41 HZ 421	Sierra Blanca
Archeological Site No. 41 HZ 422	Sierra Blanca
Archeological Site No. 41 HZ 423	Sierra Blanca
Archeological Site No. 41 HZ 424	Sierra Blanca
Archeological Site No. 41 HZ 425	Sierra Blanca
Archeological Site No. 41 HZ 426	Sierra Blanca
Archeological Site No. 41 HZ 427	Sierra Blanca
Archeological Site No. 41 HZ 428	Sierra Blanca
Archeological Site No. 41 HZ 429	Sierra Blanca
Archeological Site No. 41 HZ 430	Sierra Blanca
Archeological Site No. 41 HZ 431	Sierra Blanca
Archeological Site No. 41 HZ 432	Sierra Blanca
Archeological Site No. 41 HZ 433	Sierra Blanca
Archeological Site No. 41 HZ 434	Sierra Blanca
Archeological Site No. 41 HZ 435	Sierra Blanca
Archeological Site No. 41 HZ 436	Sierra Blanca
Archeological Site No. 41 HZ 437	Sierra Blanca
Archeological Site No. 41 HZ 438	Sierra Blanca
Archeological Site No. 41 HZ 439	Sierra Blanca
Archeological Site No. 41 HZ 440	Sierra Blanca
Archeological Site No. 41 HZ 441	Sierra Blanca
Archeological Site No. 41 HZ 442	Sierra Blanca
Archeological Site No. 41 HZ 443	Sierra Blanca
Archeological Site No. 41 HZ 445	Sierra Blanca
Archeological Site No. 41 HZ 448	Sierra Blanca
Archeological Site No. 41 HZ 464	Sierra Blanca
Archeological Site No. 41 HZ 465	Sierra Blanca
Archeological Site No. 41 HZ 7	Sierra Blanca
Hudspeth County Courthouse	Sierra Blanca
Indian Hot Springs Health Resort Historic District	Sierra Blanca
Johnson, Rod, Site	Sierra Blance

NRHP Listed Property	County
Red Rock Archeological Complex	Allamore
Tinaja de las Palmas Battle Site	Sierra Blanca
Jeff Davis County, Texas	
Fort Davis National Historic Site	Fort Davis
Fort Davis National Historic Site	Fort Davis
Fort Davis National Historic Site	Fort Davis
Fort Davis National Historic Site	Fort Davis
Fort Davis National Historic Site	Fort Davis
Fort Davis National Historic Site	Fort Davis
Grierson-Sproul House	Fort Davis
Phantom Lake Spring Site	Toyahvale
Trueheart, Henry M. and Annie V., House	Fort Davis
Presidio County, Texas	
El Fortin del Cibolo Historic District	Shafter
El Paisano Hotel	Marfa
Fort Leaton	Presidio
Fortin de la Cienega	Shafter
La Junta de los Rios Archeological District	Presidio
La Morita Historic District	Shafter
Presidio County Courthouse	Marfa
Shafter Historic Mining District	Shafter
Tapalcomes	Redford
Brewster County, Texas	
Brewster County Courthouse and Jail	Alpine
Burro Mesa Archeological District	Panther Junction
Castolon Historic District	Big Bend National Park
Castolon Historic District	Big Bend National Park
Castolon Historic District	Big Bend National Park
Castolon Historic District	Big Bend National Park
Castolon Historic District	Big Bend National Park
Castolon Historic District	Big Bend National Park
Daniels Farm House	Rio Grande Village
Hot Springs	Big Bend National Park
Luna Jacal	Big Bend National Park
Mariscal Mine	Big Bend National Park
Nolte--Rooney House	Alpine
Rancho Estelle	Big Bend National Park
Terlingua Historic District	Terlingua
Wilson, Homer, Ranch	Santa Elena Junction
Terrell County, Texas	
Bullis' Camp Site	Dryden
Geddis Canyon Rock Art Site	Dryden

NRHP Listed Property	**County**
Meyers Springs Pictograph Site	Dryden
Wroe Ranch Shelter No. 1	Sheffield
Val Verde County, Texas	
Cassinelli Gin House	Del Rio
Lower Pecos Canyon Archeological District	Comstock
Mile Canyon	Langtry
Rattlesnake Canyon Site	Langtry
San Felipe Creek Archeological District	Del Rio
Seminole Canyon Archeological District	Comstock
Seminole Canyon District (Boundary Increase)	Comstock
Seven Mile Ranch Archeological District	Comstock
Val Verde County Courthouse And Jail	Del Rio
West of Pecos Railroad Camps District	Comstock
Kinney County, Texas	
Fort Clark Historic District	Brackettville
Maverick County, Texas	
Fort Duncan	Eagle Pass
Maverick County Courthouse	Eagle Pass
Webb County, Texas	
Fort McIntosh	Laredo
Hamilton Hotel	Laredo
Laredo US Post Office, Court House and Custom House	Laredo
Los Ojuelos	Mirando City
San Augustin de Laredo Historic District	Laredo
San Jose de Palafox Historic/Archeological District	Laredo
Webb County Courthouse	Laredo
Zappata County, Texas	
Corralitos Ranch	San Ygnacio
Dolores Nuevo	Laredo
Dolores Viejo	San Ygnacio
San Francisco Ranch	San Ygnacio
San Ygnacio Historic District	San Ygnacio
Trevino--Uribe Rancho	San Ygnacio
Trevino--Uribe Rancho	San Ygnacio
Starr County, Texas	
de la Pena, Silverio, Drugstore and Post Office	Rio Grande City
Fort Ringgold Historic District	Rio Grande City
LaBorde House, Store and Hotel	Rio Grande City
Roma Historic District	Roma
Roma-San Pedro International Bridge	Roma-Los Saenz

NRHP Listed Property	County
Hidalgo County, Texas	
Border Theater	Mission
El Sal Del Rey Archeological District	Linn
La Lomita Historic District	Mission
Lomita Boulevard Commercial Historic District	Mission
Louisiana--Rio Grande Canal Company Irrigation System	Hidalgo
Miller, Sam and Marjorie, House	McAllen
Old Hidalgo Courthouse and Buildings	Hidalgo
Old Hidalgo School	Hidalgo
Rancho Toluca	Progreso
Cameron County, Texas	
Brazos Santiago Depot (41CF4)	Port Isabel
Brooks, Samuel Wallace, House	Brownsville
Browne-Wagner House	Brownsville
Cameron County Courthouse	Brownsville
Cameron County Jail, Old	Brownsville
Celaya, Augustine, House	Brownsville
Celaya--Creager House	Brownsville
Fernandez, Miguel, Hide Yard	Brownsville
Fort Brown	Brownsville
Fort Brown	Brownsville
Fort Brown	Brownsville
Fort Brown	Brownsville
Fort Brown	Brownsville
Garcia Pasture Site	Port Isabel
Immaculate Conception Church	Brownsville
La Madrilena	Brownsville
La Nueva Libertad	Brownsville
Manautou House	Brownsville
Old Brulay Plantation	Brownsville
Palmito Ranch Battlefield	Brownsville
Palo Alto Battlefield National Historic Site	Brownsville
Palo Alto Battlefield National Historic Site	Brownsville
Point Isabel Lighthouse	Port Isabel
Resaca de la Palma Battlefield	Brownsville
Southern Pacific Railroad Passenger Depot	Brownsville
Stillman, Charles, House	Brownsville
The Gem	Brownsville

APPENDIX D
FARMLAND CONVERSION IMPACT RATING

U.S. DEPARTMENT OF AGRICULTURE

Form AD-1006

FARMLAND CONVERSION IMPACT RATING

PART 1 ***(To be completed by Federal Agency)***	1. Date of Land Evaluation Request	2. Sheet ____ of _____
3. Name of Project	4. Federal Agency Involved	
5. Proposed Land Use	6. County and State	7. Type of Project: Corridor ☐ Other ☐
PART II ***(To be completed by NRCS)***	1. Date Request Received by NRCS	2. Person Completing the NRCS parts of this form
3. Does the site or corridor contain prime, unique ,statewide or local important farmland? Yes ☐ No ☐ (If no, the FPPA does not apply - Do not complete additional parts of this form)		4. Acres Irrigated / 5. Average Farm Size
6. Major Crop(s)	7. Farmable Land in Government Jurisdiction Acres: %	8. Amount of Farmland As Defined in FPPA Acres: %
9. Name of Land Evaluation System Used	10. Name of Local Site Assessment System	11. Date Land Evaluation Returned by NRCS

PART III ***(To be completed by Federal Agency)***		Alternative Site Rating			
		Site A	**Site B**	**Site C**	**Site D**
A. Total Acres To Be Converted Directly					
B. Total Acres To Be Converted Indirectly, Or To Receive Services					
C. Total Acres in Site					
PART IV ***(To be completed by NRCS) Land Evaluation Information***					
A. Total Acres Prime and Unique Farmland					
B. Total Acres Statewide and Local Important Farmland					
C. Percentage of Farmland in County or Local Govt. Unit to be Converted					
D. Percentage of Farmland in Govt. Jurisdiction with Same or Higher Relative Value					
PART V ***(To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland to be Serviced or Converted (Scale of 0 - 100 Points)***					
PART VI ***(To be completed by Federal Agency) Corridor or Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b & c))***	**Max. Points Corridor Other**				
1. Area in Nonurban Use	15 15				
2. Perimeter in Nonurban Use	10 10				
3. Percent of Site Being Farmed	20 20				
4. Protection Provided by State and Local Government	20 20				
5. Distance from Urban Built-up area	0 15				
6. Distance to Urban Support Services	0 15				
7. Size of Present Farm Unit Compared to Average	10 10				
8. Creation of Non-Farmable Farmland	25 10				
9. Availability of Farm Support Services	5 5				
10. On-Farm Investments	20 20				
11. Effects of Conversion on Farm Support Services	25 10				
12. Compatibility with Existing Agricultural Use	10 10				
TOTAL CORRIDOR OR SITE ASSESSMENT POINTS	160				
PART VII ***(To be completed by Federal Agency)***					
Relative Value of Farmland (from Part V above)	100				
Total Corridor or Site Assessment (From Part VI above or a local site assessment)	160				
TOTAL POINTS ***(Total of above 2 lines)***	260				

PART VIII ***(To be completed by Federal Agency after final alternative is chosen)***		
1. Corridor or Site Selected:	2. Date of Selection:	3. Was A Local Site Assessment Used? Yes ☐ No ☐
4. Reason For Selection:		

Signature of person completing the Federal Agency parts of this form:	DATE

Wisconsin substitute form AD-1006 6-9-97 Completion instructions: http://www.wi.nrcs.usda.gov/soil/prime/prinotes.html

APPENDIX E
PUBLIC INVOLVEMENT

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
Attn: R. Mark Wilson, Field Supervisor
100 North Park, Suite 320
Helena, MT 59601

Dear Mr. Wilson:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Sheridan, Daniels, Valley, Phillips, Blaine, Hill, Liberty, Toole, Glacier, Flathead, and Lincoln Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

United States Department of the Interior

FISH AND WILDLIFE SERVICE
MONTANA FIELD OFFICE
100 N. PARK, SUITE 320
HELENA, MT 59601
PHONE (406) 449-5225, FAX (406) 449-5339

File: M.10 Department of the Army (I)

January 16, 2002

William Fickel, Jr
Fort Worth District, Corps of Engineers
P.O. BOX 17300
Fort Worth, Texas 76102-0300

Dear Mr. Fickel:

This letter responds to the October 18, 2001 request for a list of Federally endangered and threatened species that may occur in Sheridan, Daniels, Valley, Phillips, Blaine, Hill, Liberty, Toole, Glacier, Flathead, and Lincoln counties. This list is provided for the U.S. Army Corps of Engineers acting for the U.S. Immigration and Naturalization Service in preparing a programmatic Environmental Assessment for the installation and operation of remote surveillance systems that is currently being developed.

On November 22, 1994, the Service approved a plan to establish nonessential experimental populations of wolves in Yellowstone National Park and central Idaho. Rules published in the *Federal Register* designate gray wolves in each area as nonessential experimental populations under section 10(j) of the Act. Within the designated nonessential experimental population areas described and depicted in the rules, all gray wolves will be managed in accordance with the provisions outlined the rules which include the following:

a) For section 7 consultation purposes wolves designated as nonessential experimental that are within the boundaries of any unit of the National Park or National Wildlife Refuge systems are treated as a threatened species. As such, the section 7 procedures for listed species would apply to Federal actions within National Parks and National Wildlife Refuges.

b) Wolves designated as nonessential experimental that are not within units of the National Park or National Wildlife Refuge systems but are within the boundaries of the nonessential experimental population area are treated as proposed species for section 7 purposes. As such, Federal agencies are only required to confer with the Service when they determine that an action they authorize fund or carry out "is likely to jeopardize the continued existence" of the species.

c) Wolves occurring outside the central Idaho and Yellowstone nonessential experimental population areas retain their endangered status.

The central Idaho experimental population area includes portions of Idaho south of Interstate 90 and west of Interstate 15. It also includes a corner of Montana south of Interstate 90, east of Highway 93 as it runs south of Missoula, south of Highway 12 to Lolo pass, and west of Interstate 15. The experimental population area for the Yellowstone region includes the entire State of Wyoming, a portion of southeastern Idaho east of Interstate 15, and a portion of Montana east of Interstate 15 and south of the Missouri River. Wolfs are listed as endangered in Sheridan, Daniels, Valley, Phillips, Blaine, Hill, Liberty, Toole, Glacier, Flathead, and Lincoln counties.

The Service recommends that the U.S. Corps of Engineers analyze the impacts on nonessential experimental populations, along with other populations of fish and wildlife, when complying with the requirements of the National Environmental Policy Act (NEPA) and other relevant land management statutes. Any protective measures in addition to those outlined in the final rules for managing the nonessential experimental wolf populations, or additional review procedures, are at the discretion of the National Park Service.

In accordance with section 7(c) of the Act, the Service has determined that the following listed, proposed, and candidate species are present in:

C = Candidate
LT = Listed Threatened
LE = Listed Endangered
PCH = Proposed Critical Habitat
PT = Proposed Threatened
* = Listed endangered except in non-essential experimental population area

County/Scientific Name	Common Name	Status
BLAINE		
Scaphirhynchus albus	Pallid Sturgeon	LE
Charadrius montanus	Mountain Plover	PT
Cynomys ludovicianus	Black-tailed Prairie Dog	C
Haliaeetus leucocephalus	Bald Eagle	LT
Mustela nigripes	Black-footed Ferret	LE*
DANIELS		
Haliaeetus leucocephalus	Bald Eagle	LT
FLATHEAD		
Salvelinus confluentus	Bull Trout	LT
Haliaeetus leucocephalus	Bald Eagle	LT
Ursus arctos horribilis	Grizzly Bear	LT
Silene spaldingii	Spalding's Campion	LT
Canis lupus	Gray Wolf	LE
Lynx canadensis	Canada Lynx	LT
GLACIER		
Haliaeetus leucocephalus	Bald Eagle	LT
Ursus arctos horribilis	Grizzly Bear	LT
Canis lupus	Gray Wolf	LE
Lynx canadensis	Canada Lynx	LT
Salvelinus confluentus	Bull Trout	LT
Botrychium lineare	Slender Moonwort	C

County/Scientific	Common Name	Status
HILL		
Haliaeetus leucocephalus	Bald Eagle	LT
Mustela nigripes	Black-footed Ferret	LE
Charadrius montanus	Mountain Plover	PT
Cynomys ludovicianus	Black-tailed Prairie Dog	C
LIBERTY		
Haliaeetus leucocephalus	Bald Eagle	LT
Mustela nigripes	Black-footed Ferret	LE
Charadrius montanus	Mountain Plover	PT
Cynomys ludovicianus	Black-tailed Prairie Dog	C
LINCOLN		
Acipenser transmontanus	White Sturgeon (Kootenai River Pop.)	LE
Haliaeetus leucocephalus	Bald Eagle	LT
Ursus arctos horribilis	Grizzly Bear	LT
Silene spaldingii	Spalding's Campion	LT
Canis lupus	Gray Wolf	LE
Lynx canadensis	Canada Lynx	LT
Salvelinus confluentus	Bull Trout	LT
PHILLIPS		
Scaphirhynchus albus	Pallid Sturgeon	LE
Haliaeetus leucocephalus	Bald Eagle	LT
Charadrius melodus	Piping Plover	LT, PCH
Charadrius montanus	Mountain Plover	PT
Mustela nigripes	Black-footed Ferret	LE*
Cynomys ludovicianus	Black-tailed Prairie Dog	C
SHERIDAN		
Charadrius melodus	Piping Plover	LT, PCH
Grus americana	Whooping Crane	LE
Haliaeetus leucocephalus	Bald Eagle	LT
Cynomys ludovicianus	Black-tailed Prairie Dog	C
TOOLE		
Haliaeetus leucocephalus	Bald Eagle	LT
Mustela nigripes	Black-footed Ferret	LE
Charadrius montanus	Mountain Plover	PT
Cynomys ludovicianus	Black-tailed Prairie Dog	C

County/Scientific Name	Common Name	Status
VALLEY		
Scaphirhynchus albus	Pallid Sturgeon	LE
Charadrius melodus	Piping Plover	LT, PCH
Mustela nigripes	Black-footed Ferret	LE
Charadrius montanus	Mountain Plover	PT
Sterna antillarum athalassos	Interior Least Tern	LE
Haliaeetus leucocephalus	Bald Eagle	LT
Cynomys ludovicianus	Black-tailed Prairie Dog	C

Section 7(c) of the Act requires that Federal agencies proposing major construction activities complete a biological assessment to determine the effects of the proposed actions on listed and proposed species and use the biological assessment to determine whether formal consultation is required. A major construction activity is defined as "a construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act" (50 CFR Part 402). If a biological assessment is not required (i.e., all other actions), the Federal agency is still required to review their proposed activities to determine whether listed species may be affected. If such a determination is made, formal consultation with the Service is required.

For those actions wherein a biological assessment is required, the assessment should be completed within 180 days of initiation. This time-frame can be extended by mutual agreement between the Federal agency or its designated non-Federal representative and the Service. If an assessment is not initiated within 90 days, this list of threatened and endangered species should be verified with the Service prior to initiation of the assessment. The biological assessment may be undertaken as part of the Federal agency's compliance of section 102 of the NEPA and incorporated into the NEPA documents. We recommend that biological assessments include the following:

1. A description of the project.
2. A description of the specific area that may be affected by the action.
3. The current status, habitat use, and behavior of T/E species in the project area.
4. Discussion of the methods used to determine the information in Item 3.
5. An analysis of the affects of the action on listed species and proposed species and their habitats, including an analysis of any cumulative effects.
6. Coordination/mitigation measures that will reduce/eliminate adverse impacts to T/E species.
7. The expected status of T/E species in the future (short and long term) during and after project completion.
8. A determination of "May affect, likely to adversely affect" or "May affect, not likely to adversely affect" for listed species.
9. A determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species.
10. Citation of literature and personal contacts used in developing the assessment.

If it is determined that a proposed program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. If it is concluded that the project "is not likely to adversely affect" listed species, the Service should be asked to review the assessment and concur with the determination of no adverse effect.

Pursuant to section 7(a) (4) of the Act, if it is determined that any proposed species may be jeopardized, the Federal agency should initiate a conference with the Service to discuss conservation measures for those species. Although candidate species have no legal status and are afforded no protection under the Act, they are included here to alert your agency of potential proposals or listings.

A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare biological assessments. However, the ultimate responsibility for section 7 compliance remains with the Federal agency and written notice should be provided to the Service upon such a designation. We recommend that Federal agencies provide their non-Federal representatives with proper guidance and oversight during preparation of biological assessments and evaluation of potential impacts to listed species.

Section 7(d) of the Act requires that the Federal agency and permit/license applicant shall not make any irreversible or irretrievable commitment of resources which would preclude the formulation of reasonable and prudent alternatives until consultation on listed species is completed.

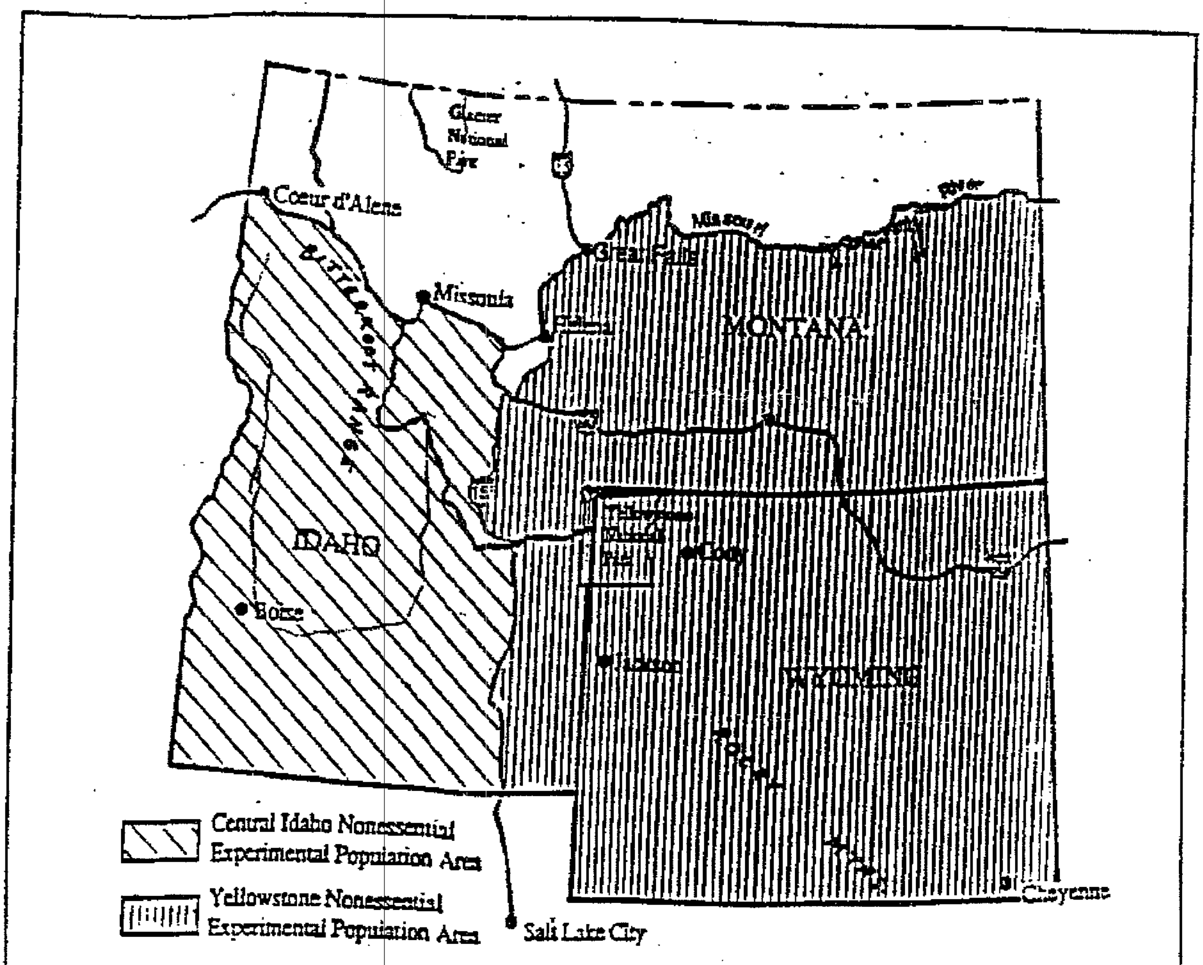
If we can be of further assistance, please contact Dan Brewer at dan_brewer@fws.gov or by phone 406-449-5225 extension 216. Your interest and cooperation in meeting our joint responsibilities under the Endangered Species Act are appreciated.

Sincerely,

R. Mark Wilson
Field Supervisor

Enclosure: Map and descriptions of experimental population boundaries.

The experimental population area for the Yellowstone region includes the entire State of Wyoming, a portion of southeastern Idaho east of Interstate 15, and a portion of Montana east of Interstate 15 and south of the Missouri River. The central Idaho experimental population area includes portions of Idaho south of Interstate 90 and west of Interstate 15. It also includes a corner of Montana south of Interstate 90, east of Highway 93 as it runs south of Missoula, south of Highway 12 to Lolo Pass, and west of Interstate 15.



Yellowstone National Park and central Idaho non-essential, experimental recovery areas.

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

Montana Natural Heritage Program
Attn: Martin Miller
P.O. Box 201800
Helena, MT 59620-1800

Dear Mr. Miller:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding state listed species potentially occurring within those counties along the border: Sheridan, Daniels, Valley, Phillips, Blaine, Hill, Liberty, Toole, Glacier, Flathead, and Lincoln Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, or require additional information, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.
William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
North Dakota Ecological Field Services Field Office
Attn: Mr. Allyn J. Sapa, Field Supervisor
3425 Miriam Avenue
Bismarck, ND 58501-7926

Dear Mr. Sapa:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Pembina, Cavalier, Towner, Rolette, Bottineau, Renville, Burke, and Divide Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

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Sincerely,

William Fickel, Jr.
William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

803060045 Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

Mr. William Fickel, Jr.
Fort Worth District
U.S. Army Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

Dear Mr. Fickel:

I am writing in response to your letter of October 18, 2001, concerning the preparation of a Programmatic Environmental Assessment (PEA) for the installation and operation of remote video surveillance systems along North Dakota's border with Canada. The objective of preparing the PEA is to develop a categorical exclusion checklist, if appropriate, to allow for the efficient installation surveillance systems in accordance with the requirements of the National Environmental Policy Act.

To assist with your environmental planning efforts, I am enclosing a list of Federally threatened and endangered species that may occur in the border counties, including: Pembina, Cavalier, Towner, Rolette, Bottineau, Renville, Burke, and Divide. I am also forwarding a brief narrative description of the threatened and endangered species that occur in North Dakota and a booklet with profile sheets for each species. The bald eagle, which is listed as threatened, and whooping crane and gray wolf, listed as endangered, have been documented to occur in all of the subject counties. In addition, the threatened piping plover nests along sparsely vegetated shorelines of saline wetlands and lakes in three western counties: Renville, Burke, and Divide. However, we have no records documenting plover nesting activity within 1 mile of the border.

I recommend that the PEA describe the specific types of construction activities that will be authorized using the proposed categorical exclusion checklist. This information will allow the Fish and Wildlife Service and other reviewers to determine if these activities will negatively impact fish and wildlife resources and their habitats. I do not anticipate there will be any significant long-term impacts to fish and wildlife resources if the surveillance equipment is installed at existing border crossing stations where access roads, buildings, and other associated facilities are already in place. If equipment will be located in areas supporting a high density of wetlands or in more remote locations, such as the Turtle Mountains or Pembina Hills, where access roads and other facilities will need to be constructed, then there is the potential for significant impacts to fish and wildlife habitat.

The PEA provides an opportunity to describe environmental commitments that will be implemented to avoid, minimize, and/or compensate for impacts to fish and wildlife habitat. I recommend that the planned construction activities be completed in a manner which avoids impacts to aquatic resources, including lakes, streams, and wetlands, and woodland habitat, thus eliminating the need for mitigation. If the authorized projects cannot be completed without losses to aquatic and woodland habitats, then a commitment to implement mitigation measures is needed. In general, we recommend that wetlands impacted by draining or filling be replaced on an acre-for-acre basis by restoring or creating similar wetland types. Woodland impacts should be mitigated by planting and maintaining 2 acres of trees and shrubs for each acre cleared. Typically, saplings that are native to the area are planted and maintained for a 5 year period. The 2:1 ratio compensates for the time it will take before the saplings reach an adequate height to compensate for the lost habitat values.

I appreciate the opportunity to provide comments on the cooperative effort between the U.S. Army Corps of Engineers and the U.S. Immigration and Naturalization Service to improve surveillance systems along the U.S./Canadian border. Please contact Bill Bicknell of my staff, if you need additional information. He can be reached at either William_Bicknell@fws.gov or (701) 250-4414.

Sincerely,

William B. Byfield

for: Allyn J. Sapa
Field Supervisor
North Dakota Field Office

Enclosures

cc: Director, ND Game and Fish Dept., Bismarck
(Attn: Mike McKenna)

FEDERAL THREATENED, ENDANGERED, AND CANDIDATE SPECIES FOUND IN BOTTINEAU, BURKE, CAVALIER, DIVIDE, PEMBINA, RENVILLE, ROLETTE, AND TOWNER COUNTIES, NORTH DAKOTA

ENDANGERED SPECIES

Birds

Whooping crane (Grus Americana): Migrates through west and central counties during spring and fall. Prefers to roost on wetlands and stockdams with good visibility. Young adult summered in North Dakota in 1989, 1990, and 1993. Total population 140-150 birds.

Mammals

Gray wolf (Canis lupus): Occasional visitor in North Dakota. Most frequently observed in the Turtle Mountains area.

THREATENED SPECIES

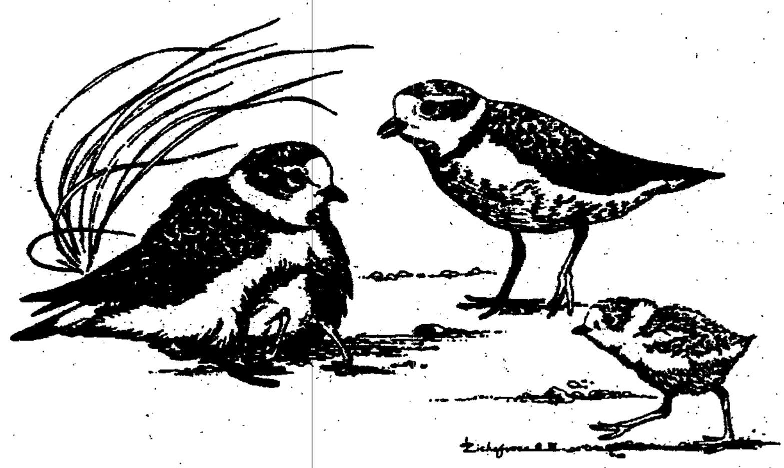
Birds

Bald eagle (Haliaeetus leucocephalus): Migrates spring and fall statewide but primarily along the major river courses. It concentrates along the Missouri River during winter and is known to nest in the floodplain forest.

Piping plover (Charadrius melodus): Nests on midstream sandbars of the Missouri and Yellowstone Rivers and along shorelines of saline wetlands. More nest in North Dakota than any other state.

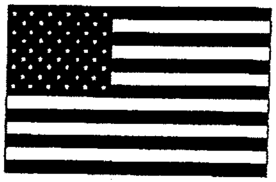
NORTH DAKOTA'S

Federally Listed
Endangered
Threatened
and
Candidate Species



May 2001

ENDANGERED SPECIES ACT



Findings and purpose of the Endangered Species Act:

When Congress authorized the Endangered Species Act, they declared that species of "fish, wildlife, and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." The purpose of the Act is to provide a means whereby endangered species and their ecosystems may be conserved. The intent of the Endangered Species Act is not to just list species as endangered or threatened, but rather, to recover the populations of these species to a point where they can be removed from the list.

History of the Endangered Species Act:

Laws passed in the late 60's gave limited attention to endangered species; it wasn't until the Endangered Species Act was passed in 1973 that significant protection was granted rare species. This landmark law, considered by some the most significant environmental law ever passed, has been amended and reauthorized by Congress on numerous occasions, most recently in 1988. The U.S. Fish and Wildlife Service administers the law for all inland species and certain marine species. The National Marine Fisheries Service administers the law for marine species.

Present status:

The Endangered Species Act was due for reauthorization in 1992. Congress is still debating reauthorization of the Endangered Species Act.

What are endangered species?:

The Endangered Species Act states that the Secretary of Interior shall determine species as endangered or threatened based on manmade factors affecting their continued existence.

Endangered: Species listed as endangered are in danger of extinction throughout all or a significant portion of their range.

Threatened: Species listed as threatened are likely to become endangered within the foreseeable future.

Candidates: The Fish and Wildlife Service maintains a list of candidate species which may warrant listing as endangered or threatened; however, the data are inconclusive. Candidate species are not protected under the Endangered Species Act.

How many endangered species are there?:

As of April 30, 2000, 1,230 species were listed as either endangered or threatened in the United States. As of May 5, 2000, 1,789 species were listed worldwide.

Are species still becoming extinct?:

Yes! Scientists estimate that three more species become extinct every day, and that number is expected to continue to rise dramatically in this century.

Why save endangered species?:

There are many reasons to save endangered species.

Genetic diversity: All organisms store valuable genetic makeup that once lost, is gone forever. For example, scientists recently found an extremely rare form of corn in South America. This wild cousin of our domestic corn is noteworthy because it is a perennial (a single plant lives for many years). If this wild corn can be hybridized with domestic corn it may relieve farmers from having to replant corn every spring.

Direct uses: Many forms of plants and animals are used directly by humans. Medicines derived from plants have a commercial value of about $40 billion a year. Scientists continue finding new plants for medicinal purposes. For example, researchers have recently found that the Pacific yew, a scrubby "non-economically important" tree, found in the rapidly disappearing old growth forests of the northwestern United States, may provide a treatment for cancer.

Environmental monitors: Many species of wildlife and plants are more susceptible to changes in the environment than humans are and therefore, will show detrimental effects before humans do. For example, in the 1960's there was a dramatic decrease in the number of bald eagles. Scientists eventually discovered that the shells of eagle eggs were thinning because of an accumulation in eagles of byproducts from the pesticide DDT. Eagles accumulated the byproducts from the fish they ate that had accumulated the pesticide from the food they ate. Many of these same species of fish were also eaten by humans.

Ecological reasons: All species are interdependent on other species in what is known as the ecological web. For example, many plants have evolved to be pollinated by a specific butterfly. If that species of butterfly became extinct, the plant would eventually also become extinct. Subsequently, other species that depend on the plant may also become extinct.

Recreation: The numbers of people who enjoy nature continues to grow every year. Dollars spent in the pursuit of outdoor recreation are in the millions, and increasing.

Ethical reasons: By causing the extinction of a species today, we are depriving future generations of the experiences and values that the species may have provided.

How does the Act affect me:

The Endangered Species Act has little effect on individuals and property owners. Individuals are affected if they "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" endangered or threatened species, unless exempted by a permit.

Can I participate?:

Yes! The Endangered Species Act allows and encourages the public to comment and participate on activities concerning endangered species.

Comments:

For more information on endangered species in North Dakota, or to assist in protecting endangered species, contact the U.S. Fish and Wildlife Service at 701-250-4481, 3425 Miriam Ave., Bismarck ND 58501. The Service web site at www.fws.gov/ also contains information on endangered species.

FEDERAL ENDANGERED, THREATENED, AND CANDIDATE SPECIES FOUND IN NORTH DAKOTA

ENDANGERED

Birds
Interior least tern (*Sterna antillarum*)
Whooping crane (*Grus americana*)

Fish
Pallid sturgeon (*Scaphirhynchus albus*)

Mammals
Black-footed ferret (*Mustela nigripes*)
Gray wolf (*Canis lupus*)

THREATENED

Birds
Bald eagle (*Haliaeetus leucocephalus*)
Piping plover (*Charadrius melodus*)

Plants
Western prairie fringed orchid (*Platanthera praeclara*)

CANDIDATE

Mammals
Black-tailed prairie dog (*Cynomys ludovicianus*)

May 2001
U.S. Fish & Wildlife Service
Bismarck, North Dakota

INTERIOR LEAST TERN

Sterna antillarum

Official Status: Endangered (North Dakota)
Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

Listed: 50 Federal Register 21792; May 28, 1985
(interior population of the least tern)

Historical Status: Historically, the least tern was found on the Atlantic, Gulf of Mexico, and California coasts and on the Mississippi, Missouri, and Rio Grande River systems. It was found throughout the Missouri River system in North Dakota.

Present Status: The interior population of the least tern presently breeds in the Mississippi, Missouri, and Rio Grande river systems. The birds usually stay in close proximity to the rivers. Census data indicates over 8,000 least terns in the interior population. Birds from the interior population winter along the Gulf of Mexico and on Caribbean Islands. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea. Approximately 100 pairs breed in North Dakota.

Habitat: In North Dakota, the least tern utilizes sparsely vegetated sandbars on the Missouri and Yellowstone Rivers. Birds nest, raise young, and relax on barren river sandbars.

Life History: The breeding season for the interior population of the least tern lasts from May through August. The peak of the nesting season occurs from mid-June to mid-July. Nests are bowl-shaped depressions, about 4" across, on barren, sandy areas. Least terns nest in colonies where the nests can be as close as a few feet apart. A typical clutch contains 2 to 3 eggs and takes about 24 days to hatch. Both parents incubate the eggs and feed the young. Young are able to fly in about 21 days. Least terns typically live 1 to 5 years. Terns forage for small fish in the river and nearby wetlands.

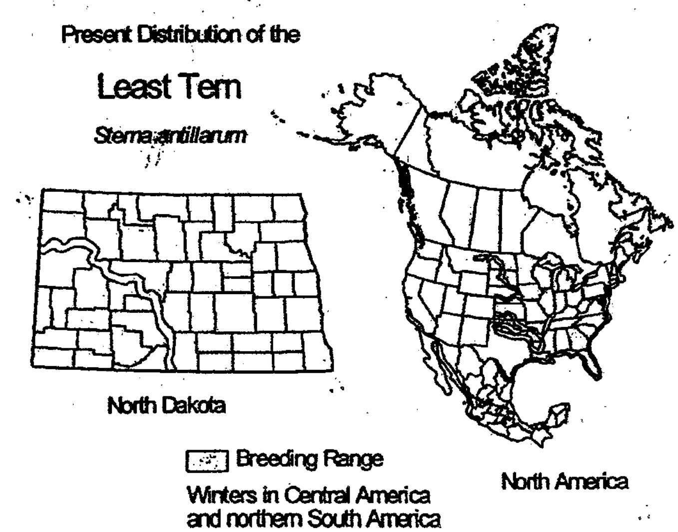
Aid to Identification: Least terns are the smallest member of the gull and tern family. They are approximately 9" in length. Unlike gulls, terns will dive into the water for small fish. The body of least terns is predominately gray and white, with black streaking on the head. Least terns have a forked tail and narrow pointed wings. Least terns less than a year old have less distinctive black streaking on the head and less of a forked tail.

Reasons for Decline: The interior population of the least tern has declined due to loss of habitat from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. Because of dams, river flows are often managed in a nonhistoric fashion, not conducive to the creation and maintenance of sandbars with sparse vegetation. Human disturbance is also a problem. Cold water temperatures due to reservoirs may affect the quantity of forage fish available.

Recommendations: Avoid sandbars that have least terns present. Adult birds with eggs or young nearby will squeal loudly while circling overhead, and may swoop down at the intruder. Leave the area immediately.

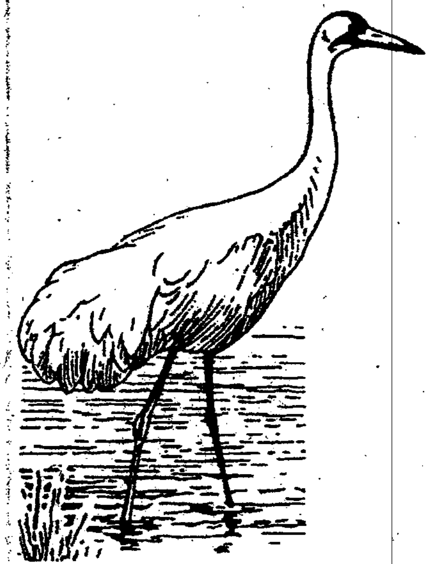
Comments: Biologists are uncertain about whether least tern populations from the Atlantic coast, California coast, and interior North America are separate subspecies or simply separate populations. For purposes of the Endangered Species Act, the U.S. Fish and Wildlife Service has assigned the endangered status to the interior population of the least tern. The California population of the least tern has been listed as endangered since 1970. The Atlantic population is not listed. Least terns in North Dakota will often be found sharing sandbars with the piping plover, a threatened species.

References: *Interior Population of the Least Tern Recovery Plan* by U.S. Fish and Wildlife Service, 1990.



WHOOPING CRANE

Grus americana



Official Status: Endangered

Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

Listed: 35 Federal Register 8495; June 2, 1970

Historical Status: The historical breeding range of the whooping crane extended from Illinois, northwest through North Dakota, and up to the Northwest Territories. The last nesting record for North Dakota was in McHenry County in 1915. The birds historically wintered along the Gulf of Mexico. By the 1940's, there were an estimated 21 whooping cranes left in the world. Most were from a flock that wintered at the Aransas National Wildlife Refuge on the coast of Texas. It was later discovered that the birds were breeding in Wood Buffalo National Park in the Northwest Territories.

Present Status: About 188 whooping cranes presently occur in the wild. Almost all of these birds are in the Aransas-Wood Buffalo flock. In 1986, a flock that migrates between Grays Lake National Wildlife Refuge in Idaho and Bosque del Apache National Wildlife Refuge in New Mexico peaked at 35 in 1998; however, only two birds remain in this population. The Aransas-Wood Buffalo population migrates through North Dakota. During the 1999 fall migration, 15 sightings occurred in North Dakota from late August to mid-October. The spring migration occurs from late April to mid-June. Birds can show up in all parts of North Dakota, although most sightings occur in the western two-thirds of the State.

Habitat: Whooping cranes inhabit shallow wetlands that are characterized by cattails, bulrushes, and sedges. They can also be found in upland areas, especially during migration.

Life History: Whooping cranes do not appear to reach sexual maturity until their 2nd or 3rd year. Courtship occurs at Wood Buffalo National Park in late April and May. Courtship rituals are eccentric with the pair performing loud vocalizations, wing flapping, head bowing, and leaps into the air. Whooping cranes mate for life. Two eggs are laid in a nest made of bulrush and other vegetation. Incubation is about 29 days. Both parents incubate the eggs and feed the young. Usually only the larger chick survives due to its more aggressive behavior. Young cranes are capable of flight in about 90 days. Whooping cranes may live 20 years. Whooping cranes feed on crabs, crayfish, frogs, and other small aquatic life, as well as plants.

Aid to Identification: The whooping crane is the tallest bird in North America. It is a white bird with black wingtips and red markings on the head. Young birds have a brown-mottled appearance until their second summer. Whooping cranes are 5 feet tall and have wingspans of 7 feet. Whooping cranes fly with a slow downward flap and a rapid upstroke. Whooping cranes may migrate with the smaller, gray, sandhill crane. The trumpet-like call carries for miles.

Reasons for Decline: Loss of habitat and shooting are the main reasons for the whooping crane's decline.

Recommendations: Many of the wild whooping cranes are marked with colored leg bands. Make observations of these birds and report them to a wildlife agency.

Comments: The status of whooping cranes in the wild is precarious because the birds concentrate during the winter. Oil spills in the Gulf of Mexico are a potential threat. Eggs from wild birds (1 per nest) have been removed and hatched in captivity. The captive birds are now reproducing.

References: *Whooping Crane Recovery* Plan by U.S. Fish and Wildlife Service, 1994.

PALLID STURGEON

Scaphirhynchus albus

Official Status: Endangered

Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

Listed: 55 Federal Register 36641; September 6, 1990.

Historical Status: Historically, pallid sturgeon were found in the Missouri River from Fort Benton, Montana, to St. Louis, Missouri; in the Mississippi River from above St. Louis to the Gulf; and in the lower reaches of other large tributaries, such as the Yellowstone, Platte, Kansas, Ohio, Arkansas, Red, and Sunflower; and in the first 60 miles of the Atchafalaya River.

Present Status: Pallid sturgeon populations are fragmented by dams on the Missouri River. Pallid sturgeon are scarce in the upper Missouri River above Ft. Peck Reservoir; in the Missouri and lower Yellowstone Rivers between Ft. Peck Dam and Lake Sakakawea; in the Missouri River downstream of Gavins Point Dam; and in the Mississippi and Atchafalaya Rivers.

Habitat: Large rivers with high turbidity and a natural flow. Preferred habitat has a diversity of depths and velocities formed by braided channels, sandbars, islands, sand flats and gravel bars.

Life History: Sexual maturity for males is estimated to be 7-9 years, with up to 3 years between spawns. Females are not expected to reach sexual maturity until 7-15 years, with up to 10-year intervals between spawning. Pallid sturgeons are long lived, with individuals perhaps reaching 60 years of age or more.

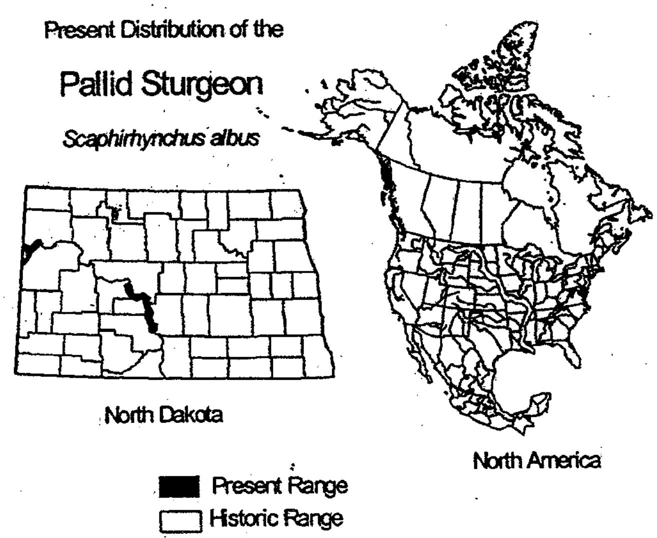
Aid to Identification: Pallid sturgeon have a unique prehistoric appearance. They have a flattened snout, long slender tail and are armored with five lengthwise rows of bony plates instead of scales. Their mouth is toothless and positioned under the snout for sucking small fishes and invertebrates from the river bottom. Pallid sturgeon can weigh up to 80 pounds and reach lengths of 6 feet, whereas the closely-related shovelnose sturgeon rarely weighs more than 8 pounds. The back and sides of pallid sturgeons are grayish-white, versus the brownish tan color of the shovelnose sturgeons.

Reasons for Decline: Habitat loss and modification from construction of dams and channelization of rivers. Commercial fishing and environmental contaminants may have also played a role in the pallid sturgeon's decline. Hybridization with the more common shovelnose sturgeon is a threat to the species and may be due to habitat modifications.

Recommendations: All species of sturgeon caught in North Dakota must be released immediately. Contact the U.S. Fish and Wildlife Service with information on any pallid sturgeon you catch.

Comments: Population augmentation and propagation has occurred to address poor recruitment of juveniles into the population. Current populations are composed of older fish that will die in the near future. Stocking now will ensure a breeding population for future recovery efforts; however, habitat restoration will also be essential to recover this species.

References: Pallid Sturgeon Recovery Plan, Fish and Wildlife Service, November 1993.



BLACK-FOOTED FERRET

Mustela nigripes

Official Status: Endangered
Endangered species are animals and plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

Listed: 35 Federal Register 8495; June 2, 1970

Historical Status: Black-footed ferrets once ranged throughout the Great Plains. It has been calculated that if all suitable habitat had been used, as many as 5.6 million black-footed ferrets may have existed in the late 1800's. Populations declined dramatically in the 1900's. The last known population was found at Meeteetse, Wyoming, in 1981. The remaining 18 individuals from this population were captured and put into a captive breeding facility in 1987.

Present Status: From 1987 until 1991, the black-footed ferret may have been extirpated in the wild. In the fall of 1991, 49 captive animals were reintroduced into the wild in Wyoming. Since 1991, ferrets have been reintroduced into Montana, South Dakota, Colorado, and Arizona. The number of wild born kits is increasing annually. Unconfirmed sightings from other areas continue to be reported. In North Dakota, the majority of the reports come from the southwest part of the State. Five zoos in the U.S. and one in Canada are currently housing and breeding about 240 black-footed ferrets.

Habitat: The black-footed ferret inhabits short-grass prairies, always within close proximity to prairie dog towns.

Life History: Black-footed ferrets can breed when 1 year old. Breeding takes place from March to May. Gestation ranges from 41 to 45 days. Typically, 3 to 4 young are born per litter. Young ferrets leave the family group around September. Juvenile males suffer high mortality, a result of their dispersing to new areas. Life expectancies for wild black-footed ferrets are probably less than 5 years. Prairie dogs comprise 90 percent of the diet of black-footed ferrets. A black-footed ferret family of four will consume an average 763 prairie dogs per year. Black-footed ferrets utilize prairie dog burrows for shelter and raising families. Black-footed ferrets are primarily nocturnal. They are active in the winter.

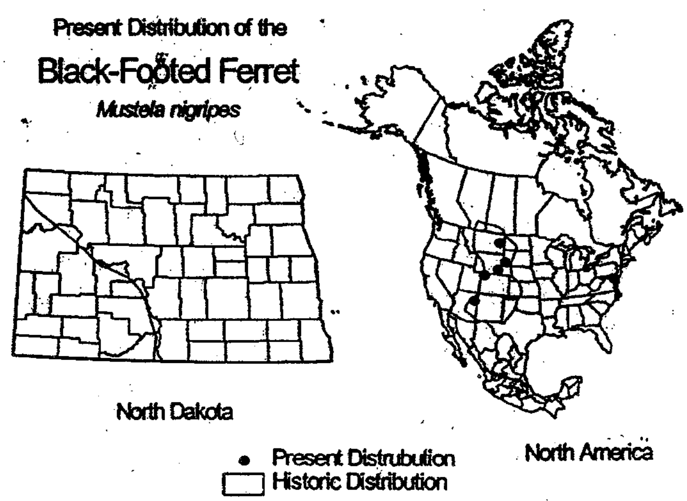
Aid to Identification: Black-footed ferrets are 20" to 24" long, including a 6" tail, and weigh up to 2½ pounds. They have a yellowish, brown body with a distinctive black mask across the face, black on the feet and the tip of the tail. The related long-tailed weasel is about half the size of the ferret and does not have the distinctive black markings.

Reasons for Decline: The rapid decline of black-footed ferrets has been linked to the eradication of prairie dogs. Prairie dogs now occupy less than 1 percent of their historic range. Threats to black-footed ferrets also include canine distemper. Black-footed ferrets are susceptible to predation by golden eagles, great-horned owls, and coyotes. They are also susceptible to road kills and trapping.

Recommendations: It's recommended that individuals contact the U.S. Fish and Wildlife Service before initiating activities that affect prairie dog towns. Report any suspected black-footed ferret sightings to a wildlife agency.

Comments: Prairie dogs are essential to black-footed ferrets. Dog towns provide habitat for other rare species such as mountain plovers, burrowing owls, ferruginous hawks, prairie falcons, swift fox, and game species like antelope.

References: *Black-footed Ferret Recovery Plan* by U.S. Fish and Wildlife Service, 1988. *Handbook of Methods for Locating Black-footed Ferrets* 1984, and *Black-footed Ferret Habitat: Some Management and Reintroduction Considerations* 1985, both published by the Wyoming Game and Fish Commission and the U.S. Bureau of Land Management.



GRAY WOLF

Canis lupus

Official Status: Endangered in lower 48 states, including North Dakota; threatened in Minnesota. Endangered species are animals or plants in danger of extinction throughout all or a significant portion of their range. It is unlawful to kill, harm, or harass endangered species.

Listed: 43 Federal Register 9612; March 9, 1978 (48 conterminous states, except Minnesota)

Historical Status: The gray wolf had the greatest distribution of any mammal other than man. The gray wolf was historically found throughout North America, with the exception of parts of the southwest and southeast United States. In the southeast United States, the gray wolf was replaced by the smaller red wolf. The gray wolf was historically present throughout North Dakota, where it was known as the Plains wolf, the buffalo wolf, or the lobo wolf.

Present Status: The gray wolf is extirpated from the lower 48 states, with the exception of Minnesota (2,200 wolves); Wisconsin (180 wolves); Michigan (140 wolves); and Montana, Idaho, and Washington (total 240 wolves). However, there have been documented occurrences of gray wolves in North Dakota during the 1990's. The presence of wolves in most of North Dakota will likely remain sporadic and consist of occasional dispersing animals from Minnesota and Manitoba.

Habitat: Historically, the gray wolf occupied almost all habitats in North America, including the Great Plains. In modern times, the gray wolf has been restricted to habitats with low densities of roads and people. Likely habitat for the gray wolf in North Dakota is the forested areas in north central and northeast North Dakota, however, they may appear anywhere.

Life History: Gray wolves generally do not breed until they are 3 years of age. Gray wolves breed in late winter. After a gestation period of 63 days, an average litter of six pups is born in a den in the ground, rockpile, hollow log, or other shelter. When the pups reach 8 weeks of age, the adults may move them to another den. By October, the pups will weigh about 60 pounds and travel with the adults. Young gray wolves usually stay with the adults for 2 years, forming a pack. At 2 years of age, gray wolves may disperse hundreds of miles from their original home. Gray wolves usually hunt large animals such as moose and deer, although beaver and other smaller animals supplement their diet. Gray wolves are often more successful taking old, weak, or injured prey. Gray wolves are territorial and will keep other gray wolves and coyotes out of their 50-100 mile^2 home range. Howling is a way for pack members to communicate.

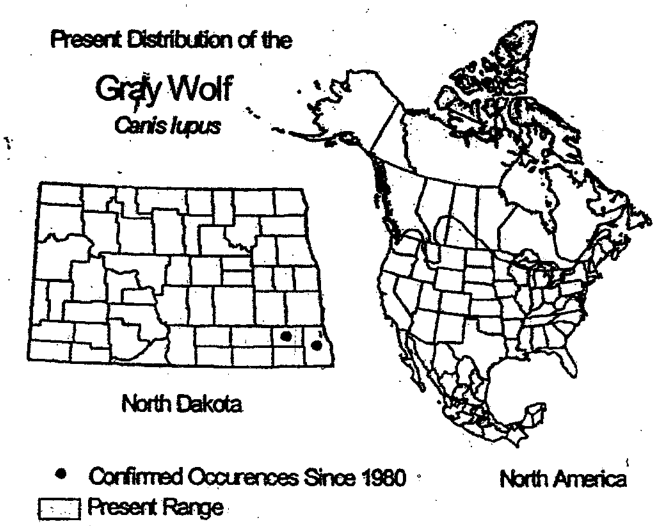
Aid to Identification: Gray wolves can range in color from white to black, although gray is the predominant color. Mature gray wolves generally weigh from 70-115 pounds and stand about 30" high at the shoulder. Coyotes are considerably smaller than gray wolves, usually weighing less than 35 pounds. A good field guide is that gray wolves will be larger than a typical German shepherd, while coyotes will be smaller. The track of a gray wolf will be about 5" long, compared to 3" for a coyote track. Some dogs, such as Great Danes, can have tracks as large as a gray wolf.

Reasons for Decline: Gray wolves have been exterminated by man throughout most of their original range. Shooting, trapping, and poisoning were often subsidized by the government. Illegal shooting continues to be a problem.

Recommendations: Reports or signs of gray wolves should be reported to the U.S. Fish and Wildlife Service.

Comments: There are no known gray wolf attacks on humans in modern times in North America. Gray wolves do take livestock, although the occurrences are rare. In gray wolf range in Minnesota, gray wolves take only 1 of every 2000 cattle. Most gray wolves avoid livestock. Some states have programs that reimburse livestock owners for wolf damage.

References: *Wolf! A Modern Look* by Wolves in American Culture Committee, 1986.



BALD EAGLE

Haliaeetus leucocephalus

Official Status: Threatened (North Dakota)
Threatened species are animals and plants likely to become endangered in the foreseeable future throughout all or a significant portion of their range.

Listed: Listed as endangered in 43 Federal Register 6233; February 14, 1978 (North Dakota and 42 other states.) Downlisted from endangered to threatened in 1995, and on July 6, 1999, proposed to delist.

Historical Status: Bald eagles are thought to have historically nested in all of the lower 48 states. In North Dakota, bald eagles were apparently common along the Missouri and Red Rivers, and at Devils Lake and the Turtle Mountains. It's estimated that in the lower 48 states there were 50,000 breeding pairs of bald eagles in pre-colonial times. Due to human activities, the population in the lower 48 states reached a low of 400 breeding pairs in the early 1960's.

Present Status: Bald eagles are abundant in Alaska and Canada. In 1998, over 5,700 breeding pairs were reported in the lower 48 states. In 1988, the first bald eagle nest in North Dakota since 1975 was documented along the Missouri River. In 1997, eight active nests were documented along the Missouri River between Garrison Dam and Lake Oahe, and one nest was reported at Devils Lake. Major wintering areas for bald eagles are along the lower reaches of the Mississippi River, and Illinois River systems, Florida and the Pacific coast. In recent years, and average of 45 eagles have wintered below the Garrison Dam.

Habitat: Bald eagles prefer forested habitats near bodies of water. Eagles concentrate near open water in the wintertime. The tailrace of the Garrison Dam provides this habitat. Migrating eagles are found throughout North Dakota.

Life History: Sexual maturity for eagles is reached at 4 to 6 years of age. Adults mate for life and tend to use the same nest year after year. The majority of nest sites are within one-half mile of water. Nests are usually at the top of tall trees, although cliffs are occasionally used. Nests can become enormous, weighing more than a ton. Usually two eggs are laid in a clutch. The eggs hatch after 35 days of incubation. Both parents assist in feeding the young. Young leave the nest after 75 days. Bald eagles feed on fish, waterfowl and other birds, small mammals, and carrion.

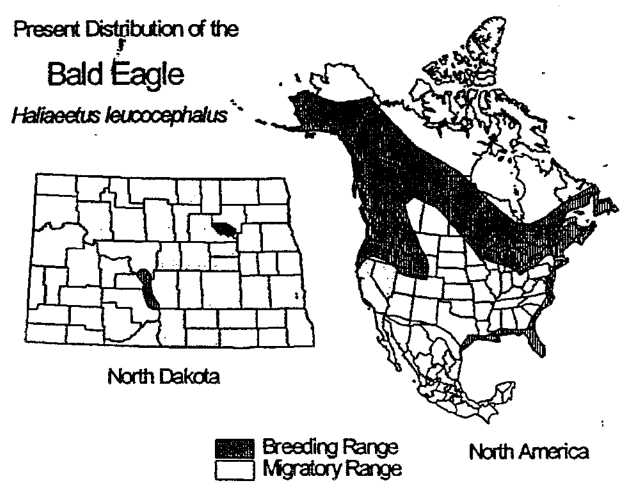
Aid to Identification: The white head and tail of mature bald eagles is an identifying characteristic. Immature birds are more difficult to identify. They are predominately brown with an increasing amount of white mottling as the bird matures. The wingspan of7 feet tends to distinguish the young birds from all other birds, except the golden eagle.

Reasons for Decline: Bald eagle populations declined in the early 20th century due to loss of habitat, shooting, and trapping. During the 1950's and 1960's, the use of pesticides, especially DDT, became a major problem. DDT residues accumulated in fish, a major food source of eagles. The residues then accumulated in the eagles that ate the fish and subsequently caused a thinning of the eggshells. DDT is now banned in the United States. Shooting, trapping, poisoning, and human disturbance continue to be a problem. Bald eagles can be electrocuted when perching on powerlines.

Recommendations: Although individual bald eagle pairs can show considerable tolerance to human activity, disturbance of nesting pairs should be minimized. Wounded or sick eagles should be reported immediately to a wildlife agency. Many rehabilitation centers exist throughout the country that can care for eagles.

Comments: In addition to being protected by the Endangered Species Act of 1973, the bald eagle is also protected by the Bald Eagle Protection Act of 1940. The bald eagle is the national symbol of the United States. The recovery goal for the bald eagle in North Dakota is to have 10 active nests by the year 2000. In 1999, the Fish and Wildlife Service proposed to delist the bald eagle.

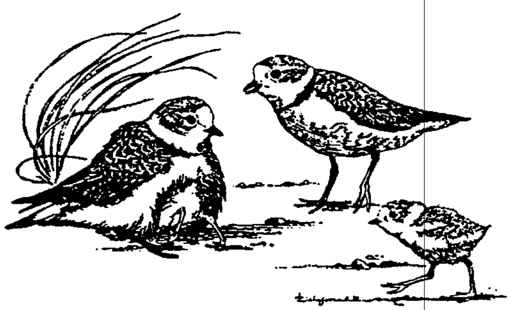
References: *Northern States Bald Eagle Recovery Plan* by



U.S. Fish and Wildlife Service, 1983.

PIPING PLOVER

Charadrius melodus



Official Status: Threatened in U.S. Northern Great Plains, including North Dakota and Montana. Endangered in Great Plains of Canada. Species are considered threatened when they are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Listed: 50 Federal Register 50733; December 11, 1985 (entire range, except Great Lakes region, where it is listed as endangered.)

Historical Status: In the Great Plains, it appears the piping plover formerly was more widely-distributed than it is today. Historically, breeding piping plovers occurred in at least 28 North Dakota counties. Plovers were observed in 20 counties during the 1990s.

Present Status: North Dakota is the most important State in the U.S. Great Plains for nesting piping plovers. The State's population of piping plovers was 496 breeding pairs in 1991 and 399 breeding pairs in 1996. More than three-fourths of piping plovers in North Dakota nest on prairie alkali lakes, while the remainder use the Missouri River. The North Dakota population spends fall to early spring primarily in the Gulf of Mexico, especially the Texas coast.

Habitat: In the Great Plains, piping plovers inhabit barren sand and gravel shores of rivers and lakes. Plovers avoid dense vegetation. Nearly all natural lakes used by plovers in North Dakota are alkaline in nature and have salt-encrusted, white beaches. Such alkali lakes probably are selected due to their sparse vegetation. Beaches used by piping plovers generally are 10-40 yards wide. Piping plovers also use barren river sandbars. In North Dakota, this habitat type is found on the Missouri and Yellowstone Rivers.

Life History: The breeding season in North Dakota extends from late April until early August. Pairs remain mated for nearly all of the breeding season. Pairs are territorial, which means they defend their nest area from other piping plovers. A 4-egg clutch is laid in a shallow depression in the open, sand/gravel substrate. Both sexes share in incubation, which lasts about 28 days. Plover chicks are able to walk and feed within hours of hatching. Chicks can fly in about 21 days. Piping plovers feed on open beaches on insects and crustaceans.

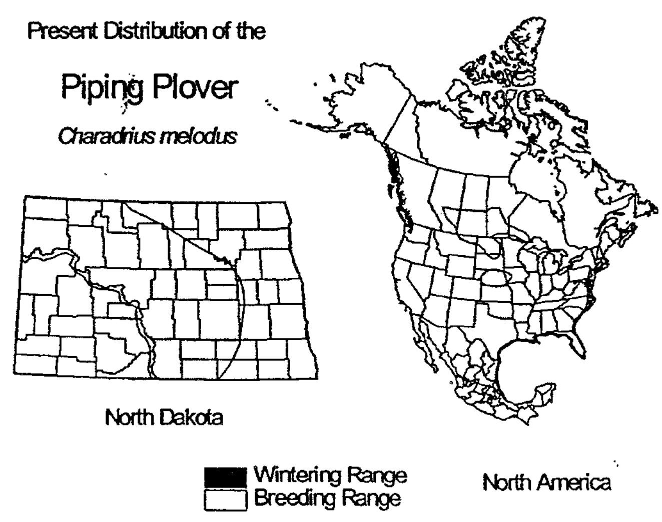
Aid to Identification: The piping plover is a small, stocky shorebird that is distinctly pale, matching the beaches it inhabits. Prominent markings include a black band across the upper forehead and another across the upper breast. The similar killdeer has two black breastbands and is larger and darker. The black bands are faint in juvenile piping plovers, and in all piping plovers during winter. Piping plovers have a distinct melodic, flute-like call.

Reasons for Decline: Habitat destruction and poor breeding success are major reasons for the population decline. In North Dakota, plovers that use prairie alkali lakes suffer significant losses of eggs and chicks to predators that have increased in abundance in recent decades. Construction of reservoirs on the Missouri River has resulted in a loss of sandbar habitat. Plovers using the remaining sandbars on the river are susceptible to predation, direct disturbance by people, and water fluctuations as the result of dam operations.

Recommendations: Avoid areas of alkali lakes and Missouri River sandbars where piping plovers are present. Leave the area immediately if piping plovers are observed. Advise others to do likewise. Restrain pets when near piping plovers. Wherever possible near alkali lakes, reduce trees, rockpiles, and abandoned vehicles and buildings that often harbor predators such as crows, raccoons, and skunks.

Comments: Piping plovers often share sandbars with least terns, an endangered species.

References: *Draft revised recovery plan for piping plovers breeding on the Great Lakes & Northern Great Plains of the U.S.* by U.S. Fish and Wildlife Service, 1994.



WESTERN PRAIRIE FRINGED ORCHID

Platanthera praeclara

Official Status: Threatened

Threatened species are animals and plants likely to become endangered species within the foreseeable future throughout all or a significant portion of their range.

Listed: 54 Federal Register 39863; September 28, 1989

Historical Status: The western prairie fringed orchid was historically found throughout the tallgrass regions of North America. This included the Dakotas, Nebraska, Kansas, Oklahoma, Missouri, Iowa, Minnesota and Manitoba. The Mississippi River was the eastern limit of its range.

Present Status: The western prairie fringed orchid has experienced at least a 60 percent decline from historic levels. Presently, populations are known from 175 sites in six states and Canada. The species appears to be extirpated from South Dakota and Oklahoma. North Dakota has one of three large populations, the other two are in Minnesota and Manitoba, Canada. In North Dakota, the population is found on and near the Sheyenne National Grasslands in the southeastern part of the State. This population numbers over 7,000 individuals.

Habitat: The western prairie fringed orchid occurs in moist tallgrass prairies and sedge meadows. In North Dakota, it is commonly found with sedges, reedgrass, and rushes or where those plants meet big bluestem, little bluestem, and switchgrass. The western prairie fringed orchid is well adapted to survive fires. Light grazing does not appear to negatively affect the western prairie fringed orchid, although researchers are still studying the relationship.

Life History: Vegetative shoots of the western prairie fringed orchid emerge in late May. Flowers do not emerge until mid-June to late July. The entire plant can display flowers for about 21 days, with individual flowers lasting up to 10 days. Flowers must be pollinated for seed production. Pollination of the western prairie fringed orchid appears to be accomplished only by hawkmoths. The microscopic seeds are dispersed by wind and flooding in early fall. The western prairie fringed orchid is a perennial; however, differences exist between North Dakota and Minnesota populations in how long an individual plant lives. In North Dakota, most plants live 3 years or less and show higher rates of mortality than Minnesota plants.

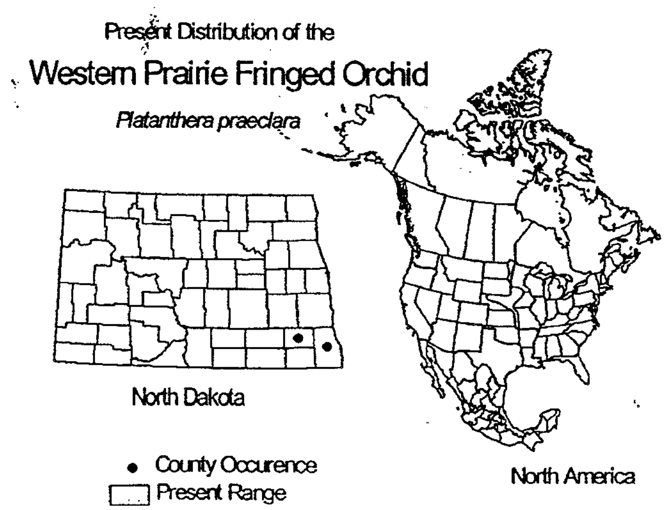
Aid to Identification: The western prairie fringed orchid is distinguished by large, white flowers that come from a single stem. Up to 20 flowers may occur on a single plant. The flower is fringed on the margins, giving it a feathery appearance. The western prairie fringed orchid grows up to 3 feet high. The 2 to 5 leaves are narrow and hug the stem.

Reasons for Decline: The main reason for the decline is that historic prairie habitat has been converted to cropland. Herbicides and the introduced plant, leafy spurge, may also have a negative affect on the western prairie fringed orchid. Heavy grazing and early haying can be detrimental.

Recommendations: Notify the U.S. Fish and Wildlife Service of any suspected western prairie fringed orchids. This includes populations that were visible in the past, but have not recently been observed.

Comments: The eastern prairie fringed orchid is similar to the western prairie fringed orchid; however, it inhabits primarily areas east of the Mississippi River. The eastern prairie fringed orchid is also listed as a threatened plant.

References: Western prairie fringed orchid *(Plantanthera praeclara)* Recovery Plan. U.S. Fish and Wildlife Service, Ft. Snelling, Minnesota. September 1996. vi+ 101 pp.



BLACK-TAILED PRAIRIE DOG

Cynomys ludovicianus

Official Status: Candidate No legal requirement exists to protect candidate species; however, it is within the spirit of the Endangered Species Act to consider these species as having significant value and worth protecting. Candidate species are animals and plants which may warrant official listing as endangered or threatened; however, the data is not conclusive at the present time. In 2000, the Fish and Wildlife Service determined the black-tailed prairie dog warrants listing; however, other species are also awaiting listing that are in greater need of protection, precluding listing of the species.

Historical Status: The historic range of the black-tailed prairie dog included portions of 11 states, Canada, and Mexico. The species occurred in the southwestern third of North Dakota, west of the Missouri River.

Present Status: Black-tailed prairie dogs are found east of the continental divide in Montana, Wyoming, South Dakota, North Dakota, Oklahoma, Texas, New Mexico, Colorado, Kansas, and Nebraska. They have disappeared in Arizona. They are also found in Canada and Mexico. The occupied range of the species has declined by about 99 percent in the United States since the late 1800's and early 1900's, with less than one million acres remaining of the 100 million acres of original black-tailed prairie dog habitat. In North Dakota, the species is scattered throughout southwestern North Dakota, with remnant populations on or near the Little Missouri National Grasslands, Theodore Roosevelt National Park, and Standing Rock Reservation. Occupied black-tailed prairie dog habitat in the State has declined from about 2 million acres historically to about 32,000 acres today.

Habitat: The black-tailed prairie dog is found in short-grass and mixed-grass prairies.

Life History: Prairie dogs are social animals that live in colonies or towns covering one to thousands of acres of prairie habitat. A family, also called a coterie, consists of one adult male, one to four breeding females, and their offspring younger than 2 years of age. Prairiedogs are active year-round, but will remain underground for several days during extremely harsh weather. Female black-tailed prairie dogs do not breed until their second year and usually live 3-5 years. Prairie dogs produce a single litter, usually of 4-5 pups annually. In the absence of plague and control, prairie dogs can expand colonies rapidly, especially where drought and overgrazing occur. Prairie dogs may disperse from the home colony. They may move about 2½ miles, usually into an already established colony, rather than attempting to start a new colony.

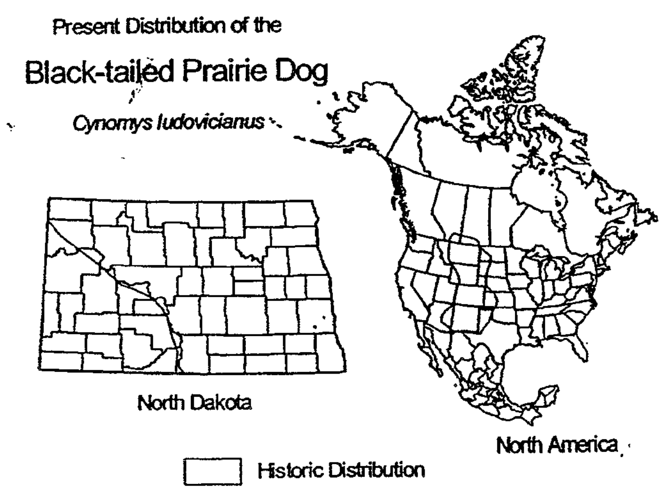
Aid to Identification: Black-tailed prairie dogs are stout, burrowing animals, approximately 14-17 inches long and weighing about 1-3 pounds. They are generally yellowish tan in color, but with a slightly lighter color on the belly. Their eyes are somewhat large for their body size; they have short ears and a short tail that is tipped in black.

Reasons for Decline: Conversion of prairie to farmland, large-scale poisoning, and the disease sylvatic plague.

Recommendations: The U.S. Fish and Wildlife Service recommends that individuals contact us before initiating activities that affect prairie dog towns.

Comments: Prairie dogs are an integral part of the prairie ecosystem and their presence increases both animal and plant diversity. The black-tailed prairie dog provides important habitat and/or prey for many species, including the endangered black-footed ferret, mountain plover, burrowing owl, swift fox, badger, and ferruginous hawk.

References: Twelve-month Administrative Finding for the Black-tailed Prairie Dog, U.S. Fish and Wildlife Service, February 2000. Prairie DogProblems: An Update on Efforts in North Dakota, North Dakota Outdoors, November 1999.



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

North Dakota Natural Heritage Program
North Dakota Parks & Recreation Department
ATTN: Ms. Kathy Duttenhefner, Coordinator
1835 Bismarck Expressway
Bismarck, ND 58504

Dear Ms. Duttenhefner:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding state listed species potentially occurring within those counties along the border: Pembina, Cavalier, Towner, Rolette, Bottineau, Renville, Burke, and Divide Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

80306045
Correspondence

PER-EE

North Dakota Parks & Recreation Department

1835 Bismarck Expressway, Bismarck, ND 58504
Phone: (701) 328-5357 Fax: (701) 328-5363 E-Mail: parkrec@state.nd.us Web: http://www.ndparks.com

north dakota parks and recreation

John Hoeven, Governor

Douglass A. Prchal, Director

Field Manager
Brad Pozarnsky
#2 Lake Metigoshe State Park
Bottineau, ND 58318
Ph (701) 263-4054

Cross Ranch
1403 River Road
Center, ND 58530
Ph (701) 794-3731
·Little Missouri-Killdeer

Devils Lake
152 S. Duncan Dr.
Devils Lake, ND 58301
Ph. (701) 766-4015
·Black Tiger Bay
·Grahams Island
·Shelvers Grove

Ft. Abraham Lincoln
4480 Fort Lincoln Road
Mandan, ND 58554
Ph (701) 663-9571
·Sully Creek-Medora

Ft. Ransom
5981 Walt Hjelle Parkway
Ft Ransom, ND 58033
Ph. (701) 973-4331
·Beaver Lake-Wishek
Ph (701) 452-2752

Ft. Stevenson
1252A 41st Ave. NW
Garrison, ND 58540
Ph (701) 337-5576

Icelandic
13571 Hwy 5
Cavalier, ND 58220
Ph. (701) 265-4561

Lake Metigoshe
#2 Lake Metigoshe State Park
Bottineau, ND 58318
Ph (701) 263-4651

Lake Sakakawea
Box 732
Riverdale, ND 58565
Ph (701) 487-3315

Lewis & Clark
4904 119th Rd. NW
Epping, ND 58843
Ph (701) 859-3071

Turtle River
3084 Park Ave
Arvilla, ND 58214
Ph (701) 594-4445
·Elmwood Grafton

November 29, 2001

William Fickel, Jr.
Planning, Environmental and Regulatory Division
Department of the Army
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. Fickel:

In response to your request for heritage information along the United States/Canada border, the North Dakota Natural Heritage Inventory has compiled several spreadsheets listing the rare species found within each of the counties along the border.

A digital copy of our data is available in the form a point shapefile (GIS format). The NDNHI requires the recipient of this data to first sign an Agreement for the Release of Data (enclosed). Once we receive the signed agreement the digital information can be released.

For additional information please contact Christine Dirk at cdirk@state.nd.us or 701-328-5368.

Sincerely,

Kathy Duttenhefner

Kathy Duttenhefner, Coordinator/Biologist
Natural Resource Program
Nature Preserve Program/Natural Heritage Inventory

R.USNDNHI*935

North Dakota Parks & Recreation Department

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Bottineau, ND 58318
Ph. (701) 263-4651

Lake Sakakawea
Box 732
Riverdale, ND 58565
Ph (701) 487-3315

Lewis & Clark
4904 119th Rd. NW
Epping, ND 58843
Ph. (701) 859-3071

Turtle River
3084 Park Ave.
Arvilla, ND 58214
Ph. (701) 594-4445
•Elmwood-Grafton

January 10, 2002

William Fickel, Jr.
Planning, Environmental and Regulatory Division
Department of the Army
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. Fickel:

In response to your request for digital heritage information the following data has been copied to the enclosed CD-ROM:

- Three unprojected shapefiles and associated attribute tables containing rare species and ecological community locations and information for occurrences within Bottineau, Burke, Cavalier, Divide, Pembina, Renville, Rolette, and Towner Counties.
  - Animal.shp
  - Plants.shp
  - Comm..shp
- The North Dakota Natural Heritage Inventory Methodology and the Guide to North Dakota Biological and Conservation Data.
  - methodology_guide.doc
- The North Dakota Rare Species Lists.
  - Rareanimals2002.xls
  - Rareplants2002.xls

For additional information please contact Christine Dirk at cdirk@state.nd.us or 701-328-5368.

Sincerely,

Kathy Duttenhefner

Kathy Duttenhefner, Coordinator/Biologist
Natural Resource Program
Nature Preserve Program/Natural Heritage Inventory

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
Green Bay Ecological Services Field Office
ATTN: Ms. Janet Smith
1015 Challenger Court
Green Bay, WI 54311-8331

Dear Ms. Smith:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Iron, Ashland, Bayfield, and Douglas Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

WA
Pi IC
Surveillance Camera

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Green Bay ES Field Office
1015 Challenger Court
Green Bay, Wisconsin 54311-8331
Telephone 920/465-7440
FAX 920/465-7410

December 3, 2001

Mr. William Fickel, Jr.
Planning, Environmental and Regulatory
Department of the Army
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

re: Proposed Programmatic Environmental Assessment for the Installation and Operation of Remote Video Surveillance Systems
Iron, Ashland, Bayfield and Douglas Counties, Wisconsin

Dear Mr. Fickel:

The U.S. Fish and Wildlife Service has received your letter dated October 18, 2001, requesting comments on the subject project. Due to staff time constraints and priority work activities, we are able to only review your project for potential impacts to federally-listed threatened and endangered species or those proposed for listing. Be advised that other environmental concerns may be associated with this project such as wetland and stream impacts, erosion control needs, and effects on state-listed threatened or endangered species. State or federal permits may be needed, as well, if stream or wetland impacts will occur. If resource impacts are expected to occur, we recommend that you forward this project to the appropriate Wisconsin Department of Natural Resources office for their review.

Please provide us copies of any future review documents that may be associated with this project or of future projects you may be planning that would require Service review. This will allow us to keep our files current. We will provide comments as time and work priorities allow.

<u>Federally-Listed Threatened and Endangered Species and Critical Habitat</u>

A review of information in our files indicates that the following federally-listed threatened or endangered species or critical habitat occur in Iron, Ashland, Bayfield and Douglas Counties:

Iron County

Classification	Common Name	Scientific Name	Habitat
threatened	bald eagle	Haliaeetus leucocephalus	breeding
endangered	gray wolf	Canis lupus	northern forested areas
threatened	Canada lynx	Lynx canadensis	potential habitat

Ashland County

Classification	Common Name	Scientific Name	Habitat
threatened	bald eagle	Haliaeetus leucocephalus	breeding
endangered	gray wolf	Canis lupus	northern forested areas
threatened	Canada lynx	Lynx canadensis	potential habitat
endangered	piping plover	Charadrius melodus	sandy beaches; bare alluvial and dredge spoil islands

Bayfield County

Classification	Common Name	Scientific Name	Habitat
threatened	bald eagle	Haliaeetus leucocephalus	breeding
endangered	gray wolf	Canis lupus	northern forested areas
threatened	Canada lynx	Lynx canadensis	potential habitat
threatened	Fassett's locoweed	Oxytropis campestris var. chartacea	open sandy lakeshores

Douglas County

Classification	Common Name	Scientific Name	Habitat
threatened	bald eagle	Haliaeetus leucocephalus	breeding
endangered	gray wolf	Canis lupus	northern forested areas
endangered	Canada lynx	Lynx canadensis	potential habitat
endangered	Kirtland's warbler	Dendroica kirtlandii	potential breeding in jack pine
endangered	piping plover	Charadrius melodus	sandy beaches; bare alluvial and dredge spoil islands
critical habitat	piping plover	Charadirus melodus	sandy beaches that possess all or most of the primary constituent elements

We appreciate the opportunity to respond. Questions pertaining to these comments can be directed to Mr. Ronald Spry by calling 920-465-7420.

Sincerely,

Janet M. Smith

Janet M. Smith
Field Supervisor

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

Endangered Resources Impact Review
Bureau of Endangered Resources
PO Box 7921
Madison, WI 53707-7921

Dear Gentlemen:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding state listed species potentially occurring within those counties along the border: Iron, Ashland, Bayfield, and Douglas Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
Twin Cities Ecological Field Office
ATTN: Field Supervisor
4101 East 80th Street
Bloomington, MN 55425-1665

Dear Gentlemen:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Cook, Lake, St. Louis, Carlton, Koochiching, Lake of the Woods, Roseau, and Kittson Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

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Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

Department of Natural Resources
Natural Heritage and Nongame Research Program
Endangered Species Environmental Review Coordinator
500 Lafayette Road, Box 25
St. Paul, MN 55155

Dear Gentlemen:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

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Sincerely,

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

Corrpondence

Minnesota Department of Natural Resources

Natural Heritage & Nongame Research Program, Section of Ecological Services
500 Lafayette Road
St. Paul, Minnesota 55155-40 25

November 7, 2001

William Fickel Jr.
Planning, Environmental & Regulatory Division
Department of the Army
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. Fickel:

Enclosed is the information you requested from the Minnesota Department of Natural Resources Natural Heritage Database regarding known rare features in the following border counties: Cook, Lake, St. Louis, Carlton, Koochiching, Lake of the Woods, Roseau and Kittson. An separate index list for each county is included, along with an explanation of the fields on the indexes. Since each of the 8 counties is large, only a summary index for each county is provided. More detailed information about any of the elements listed on the indexes is available.

Our field staff from the Minnesota County Biological Survey has completed field survey work in Kittson and Roseau Counties, has started survey work in Carlton and are currently working in Cook, Lake, St. Louis Counties along the North Shore of Lake Superior. The information we have in our database about Koochiching County is limited. If there are specific areas in the eight counties that you need more detailed information about, please contact me at the phone number or e-mail address below. I can provide locational information or fact sheets about any of the element occurrences.

Sincerely,

Sharron Nelson

Sharron Nelson
Asst Database Manager
Natural Heritage and Nongame Research Program
Phone: 651-296-8324
Fax: 651-296-1811
E-mail: Sharron Nelson@DNR.state.MN.US

encl.

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN COOK COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					GEOLOGIC TIME FEATURES
			1981	1	MIXED UNIT OR SEQUENCE (MIDDLE PROTEROZOIC)
					NATURAL COMMUNITIES
			1996	1	ASPEN FOREST
			1995	1	ASPEN-BIRCH FOREST SPRUCE-FIR SUBTYPE
			1977	1	BLACK SPRUCE BOG INTERMEDIATE SUBTYPE
			1987	1	BLACK SPRUCE SWAMP
			1996	5	BOREAL HARDWOOD-CONIFER FOREST
			1987	1	DRY CLIFF (NORTHEAST)
			1996	2	LAKE BEACH (LAKE SUPERIOR) BEDROCK SUBTYPE
			1996	1	LAKE BEACH (LAKE SUPERIOR) GRAVEL-COBBLE SUBTYPE
			1996	1	LOWLAND HARDWOOD FOREST
			1996	26	NORTHERN HARDWOOD FOREST (NORTHERN)
			1995	2	NORTHERN HARDWOOD-CONIFER FOREST (NORTHERN) Y.BIRCH-W.CEDAR
			1996	1	PAPER BIRCH FOREST
			1996	2	PAPER BIRCH FOREST SPRUCE-FIR SUBTYPE
			1983	1	POOR FEN SEDGE SUBTYPE
			1992	2	RED PINE FOREST
		G4	1977	1	SHRUB SWAMP UNKNOWN/UNRESOLVED SUBTYPE
			1977	2	SPRUCE-FIR FOREST
			1995	1	SPRUCE-FIR FOREST WHITE SPRUCE-BALSAM FIR SUBTYPE
			1977	1	TAMARACK SWAMP
			1977	1	TAMARACK SWAMP SPHAGNUM SUBTYPE
			1992	12	UPLAND WHITE CEDAR FOREST
			1996	2	UPLAND WHITE CEDAR FOREST (LAKE SUPERIOR) MESIC SUBTYPE
			1995	1	WHITE CEDAR SWAMP
			1991	6	WHITE PINE FOREST (NORTHEAST)
					ANIMAL AGGREGATIONS
			1999	44	COLONIAL WATERBIRD NESTING SITE
					ANIMALS
	NON	G4	1994	1	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	SPC	G3	1997	4	COREGONUS KIYI (KIYI)
	SPC	G2	1990	4	COREGONUS ZENITHICUS (SHORTJAW CISCO)
	SPC	G4	1993	1	COTURNICOPS NOVEBORACENSIS (YELLOW RAIL)
	NON	G5	1996	9	DENDROICA CAERULESCENS (BLACK-THROATED BLUE WARBLER)
	THR	G4	1993	3	FALCO PEREGRINUS (PEREGRINE FALCON)
LT	SPC	G4	2000	22	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G5TU	2000	6	LYCAEIDES IDAS NABOKOVI (NABOKOV'S BLUE)
	NON	G4	1997	83	MICROTUS CHROTORRHINUS (ROCK VOLE)
	SPC	G3	1993	3	OPHIOGOMPHUS ANOMALIS (EXTRA-STRIPED SNAKETAIL)
	SPC	G5	1996	3	PHENACOMYS INTERMEDIUS (HEATHER VOLE)
	SPC	G5	1997	19	SOREX FUMEUS (SMOKEY SHREW)
	NON	G5	2000	2	STRIX NEBULOSA (GREAT GRAY OWL)

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN COOK COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					PLANTS
	NON	G5	2000	16	ACTAEA PACHYPODA (WHITE BANEBERRY)
	SPC	G5	2000	21	ADOXA MOSCHATELLINA (MOSCHATEL)
	SPC	G5	1998	7	AGROSTIS GEMINATA (TWIN BENTGRASS)
	NON	G5	1999	4	AGROSTIS HYEMALIS (TICKLEGRASS)
	THR	G5T5	1988	3	ALLIUM SCHOENOPRASUM VAR. SIBIRICUM (WILD CHIVES)
	THR	G5T5	1980	1	ARABIS HOLBOELLII VAR. RETROFRACTA (HOLBOELL'S ROCK-CRESS)
	NON	G4	1984	1	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	THR	G4	1994	1	ARNICA LONCHOPHYLLA (LONG-LEAVED ARNICA)
	NON	G5	1983	4	ARTEMISIA CAMPESTRIS (CANADIAN WORMWOOD)
	THR	G5	1998	8	ASPLENIUM TRICHOMANES (MAIDENHAIR SPLEENWORT)
	NON	G1	1999	2	BOTRYCHIUM ACUMINATUM (POINTED MOONWORT)
	THR	G5	1999	3	BOTRYCHIUM LANCEOLATUM (TRIANGLE MOONWORT)
	THR	G5	1998	2	BOTRYCHIUM LUNARIA (COMMON MOONWORT)
	NON	G5	1999	17	BOTRYCHIUM MATRICARIIFOLIUM (MATRICARY GRAPEFERN)
	NON		1999	4	BOTRYCHIUM MICHIGANENSE ()
	SPC	G4	1998	1	BOTRYCHIUM MINGANENSE (MINGAN MOONWORT)
	END	G2G3	1999	3	BOTRYCHIUM PALLIDUM (PALE MOONWORT)
	THR	G3	1997	3	BOTRYCHIUM RUGULOSUM (ST. LAWRENCE GRAPEFERN)
	SPC	G5	1999	8	BOTRYCHIUM SIMPLEX (LEAST MOONWORT)
	SPC	G5?	1986	4	CALAMAGROSTIS PURPURASCENS (PURPLE REEDGRASS)
	SPC	G5	1997	2	CAREX FLAVA (YELLOW SEDGE)
	NON	G5	2000	1	CAREX GYNANDRA (A SPECIES OF SEDGE)
	THR	G2G3Q	1998	1	CAREX KATAHDINENSIS (KATAHDIN SEDGE)
	NON	G5?	1998	19	CAREX MEDIA (INTERMEDIATE SEDGE)
	SPC	G5	1998	8	CAREX MICHAUXIANA (MICHAUX'S SEDGE)
	NON	G4	1998	2	CAREX ORMOSTACHYA (NECKLACE SPIKE SEDGE)
	END	G5	1999	1	CAREX PALLESCENS (PALE SEDGE)
	SPC	G5	1999	9	CAREX PRATICOLA (PRAIRIE SEDGE)
	NON	G5	1999	3	CAREX ROSSII (ROSS' SEDGE)
	SPC	G5T?	1936	1	CAREX SUPINA VAR. SPANIOCARPA (WEAK ARCTIC SEDGE)
	SPC	G5	1994	2	CAREX XERANTICA (DRY SEDGE)
	END	G5	1999	1	CASTILLEJA SEPTENTRIONALIS (NORTHERN PAINTBRUSH)
	SPC	G5	2000	37	CLAYTONIA CAROLINIANA (CAROLINA SPRING-BEAUTY)
	THR	G5	2000	14	CRATAEGUS DOUGLASII (BLACK HAWTHORN)
	THR	G3	1988	1	CYPRIPEDIUM ARIETINUM (RAM'S-HEAD LADY'S-SLIPPER)
	SPC	G5	1997	5	DESCHAMPSIA FLEXUOSA (SLENDER HAIRGRASS)
	NON	G5	2000	1	DISPORUM TRACHYCARPUM (WARTYFRUIT FAIRY BELLS)
	SPC	G4	1999	6	DRABA ARABISANS (ROCK WHITLOW-GRASS)
	END	G5	1998	2	DRABA NORVEGICA (NORWEGIAN WHITLOW-GRASS)
	THR	G3G4	1999	9	ELEOCHARIS NITIDA (NEAT SPIKE-RUSH)
	END	G5?	1980	5	EMPETRUM EAMESII (PURPLE CROWBERRY)
	END	G5	1948	1	EMPETRUM NIGRUM (BLACK CROWBERRY)
	SPC	G5?	2000	26	EUPHRASIA HUDSONIANA (HUDSON BAY EYEBRIGHT)
	NON	G5	1999	33	GEOCAULON LIVIDUM (NORTHERN COMANDRA)
	NON	G3	1998	1	JUNCUS SUBTILIS (CREEPING RUSH)
	SPC	G5	1948	4	JUNIPERUS HORIZONTALIS (CREEPING JUNIPER)
	END	G3	1998	3	LISTERA AURICULATA (AURICLED TWAYBLADE)
	SPC	G5	1924	1	LISTERA CONVALLARIOIDES (BROAD-LIPPED TWAYBLADE)

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN COOK COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					PLANTS
	SPC	G5	1998	4	LITTORELLA UNIFLORA (AMERICAN SHORE-PLANTAIN)
	SPC	G5T5	2000	11	LUZULA PARVIFLORA SSP. MELANOCARPA (SMALL-FLOWERED WOODRUSH)
	THR	G4	1999	11	MOEHRINGIA MACROPHYLLA (LARGE-LEAVED SANDWORT)
	SPC	G5	1998	2	MUHLENBERGIA UNIFLORA (ONE FLOWERED MUHLY)
	NON	G5	1999	4	MYRIOPHYLLUM TENELLUM (LEAFLESS WATER MILFOIL)
	SPC	G5?	1936	1	NAJAS GRACILLIMA (SLENDER NAIAD)
	THR	G5	1995	7	NYMPHAEA LEIBERGII (SMALL WHITE WATER-LILY)
	END	G5	1992	5	OSMORHIZA BERTEROI (CHILEAN SWEET CICELY)
	SPC	G5	1999	15	OSMORHIZA DEPAUPERATA (BLUNT-FRUITED SWEET CICELY)
	END	G5	1999	2	OXYTROPIS VISCIDA (STICKY LOCOWEED)
	SPC	G4G5	1981	1	PELTIGERA VENOSA (A SPECIES OF LICHEN)
	SPC	G5	1991	6	PHACELIA FRANKLINII (FRANKLIN'S PHACELIA)
	SPC	G5	2000	24	PINGUICULA VULGARIS (BUTTERWORT)
	SPC	G5	1999	2	PLATANTHERA CLAVELLATA (CLUB-SPUR ORCHID)
	SPC	G5	1992	8	POLYGONUM VIVIPARUM (ALPINE BISTORT)
	END	G5	1997	3	POLYSTICHUM BRAUNII (BRAUN'S HOLLY FERN)
	SPC	G5	1999	15	PYROLA MINOR (SMALL SHINLEAF)
	SPC	G5	2000	5	RANUNCULUS LAPPONICUS (LAPLAND BUTTERCUP)
	SPC	G4G5	1998	3	RHYNCHOSPORA FUSCA (SOOTY-COLORED BEAK-RUSH)
	THR	G5	1998	2	RUBUS CHAMAEMORUS (CLOUDBERRY)
	END	G5TU	1998	4	SAGINA NODOSA SSP. BOREALIS (KNOTTY PEARLWORT)
	SPC	G5	1996	2	SALIX PELLITA (SATINY WILLOW)
	END	G4	1999	1	SAXIFRAGA CERNUA (NODDING SAXIFRAGE)
	THR	G5	1994	14	SAXIFRAGA PANICULATA (ENCRUSTED SAXIFRAGE)
	END	G4G5	1975	1	SCHISTOSTEGA PENNATA (LUMINOUS MOSS)
	SPC	G4	1997	1	SCIRPUS CLINTONII (CLINTON'S BULRUSH)
	END	G5	1998	4	SELAGINELLA SELAGINOIDES (NORTHERN SPIKEMOSS)
	SPC	G5	1957	5	SENECIO INDECORUS (ELEGANT GROUNSEL)
	SPC	G4?	1997	1	SPARGANIUM GLOMERATUM (CLUSTERED BUR-REED)
	THR	G5	1998	5	SUBULARIA AQUATICA (AWLWORT)
	END	G5	1992	4	TOFIELDIA PUSILLA (SMALL FALSE ASPHODEL)
	SPC	G5?	1999	15	TORREYOCHLOA PALLIDA (TORREY'S MANNA-GRASS)
	SPC	G4	1995	2	UTRICULARIA RESUPINATA (LAVENDAR BLADDERWORT)
	THR	G5	1992	3	VACCINIUM ULIGINOSUM (ALPINE BILBERRY)
	SPC	G4	1998	2	WOODSIA ALPINA (ALPINE WOODSIA)
	THR	G5	1994	3	WOODSIA GLABELLA (SMOOTH WOODSIA)
	NON	G5T5	1998	1	WOODSIA OREGANA VAR. CATHCARTIANA (OREGON WOODSIA)
	THR	G5	1999	26	WOODSIA SCOPULINA (ROCKY MOUNTAIN WOODSIA)

ELEMENTS PRINTED = 125

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
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Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
			1998	1	ALDER SWAMP
			1998	1	BOREAL HARDWOOD-CONIFER FOREST
			1998	1	DRY CLIFF (NORTHEAST)
			1942	1	JACK PINE FOREST (NORTHEAST)
			1998	1	LAKE BEACH (LAKE SUPERIOR) BEDROCK SUBTYPE
			1998	1	MOIST CLIFF (NORTHEAST)
			1998	1	NORTHERN CONIFER SCRUBLAND
			1992	12	NORTHERN HARDWOOD FOREST (NORTHERN)
			1989	2	NORTHERN HARDWOOD-CONIFER FOREST (NORTHERN)
			1989	1	OAK FOREST (NORTHEAST)
			1998	1	PAPER BIRCH FOREST
			1991	2	RED PINE FOREST
			1998	1	ROCK OUTCROP (NORTHEAST)
			1972	1	SPRUCE-FIR FOREST
			1942	1	TAMARACK SWAMP SPHAGNUM SUBTYPE
			1989	2	UPLAND WHITE CEDAR FOREST
			1992	2	WHITE CEDAR SWAMP
			1991	3	WHITE PINE FOREST (NORTHEAST)
					ANIMAL AGGREGATIONS
			1990	2	BAT CONCENTRATION
			1998	38	COLONIAL WATERBIRD NESTING SITE
					ANIMALS
	NON	G5	1994	5	AEGOLIUS FUNEREUS (BOREAL OWL)
	NON	G4	1980	1	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	THR	G4	2000	4	CICINDELA DENIKEI (A SPECIES OF TIGER BEETLE)
	THR	G4	1993	2	CLEMMYS INSCULPTA (WOOD TURTLE)
	SPC	G3	1997	6	COREGONUS KIYI (KIYI)
	SPC	G2	1944	1	COREGONUS ZENITHICUS (SHORTJAW CISCO)
	NON	G5	1998	66	DENDROICA CAERULESCENS (BLACK-THROATED BLUE WARBLER)
	SPC	G5T5	1982	3	EREBIA DISA MANCINUS (DISA ALPINE)
	THR	G4	2000	10	FALCO PEREGRINUS (PEREGRINE FALCON)
	NON	G5	1991	1	GRUS CANADENSIS (SANDHILL CRANE)
LT	SPC	G4	2000	66	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G5	1998	1	LASMIGONA COMPRESSA (CREEK HEELSPLITTER MUSSEL)
	SPC	G5TU	2000	2	LYCAEIDES IDAS NABOKOVI (NABOKOV'S BLUE)
	NON	G4	1984	2	MICROTUS CHROTORRHINUS (ROCK VOLE)
	SPC	G4	1990	2	MYOTIS SEPTENTRIONALIS (NORTHERN MYOTIS)
	SPC	G5	1990	1	PIPISTRELLUS SUBFLAVUS (EASTERN PIPISTRELLE)
	SPC	G5T4	1982	1	PYRGUS CENTAUREAE FREIJA (GRIZZLED SKIPPER)
					PLANTS
	NON	G5	2000	33	ACTAEA PACHYPODA (WHITE BANEBERRY)
	SPC	G5	1999	1	ADOXA MOSCHATELLINA (MOSCHATEL)
	SPC	G5	1999	3	AGROSTIS GEMINATA (TWIN BENTGRASS)
	NON	G4	1990	7	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	THR	G4	2000	6	ARNICA LONCHOPHYLLA (LONG-LEAVED ARNICA)

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Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					PLANTS
	NON	G5	1999	3	ARTEMISIA CAMPESTRIS (CANADIAN WORMWOOD)
	THR	G5	2000	3	ASPLENIUM TRICHOMANES (MAIDENHAIR SPLEENWORT)
	END	G5	1991	2	ASTRAGALUS ALPINUS (ALPINE MILK VETCH)
	NON	G1	1998	1	BOTRYCHIUM ACUMINATUM (POINTED MOONWORT)
	THR	G5	1999	3	BOTRYCHIUM LANCEOLATUM (TRIANGLE MOONWORT)
	NON	G5	2000	21	BOTRYCHIUM MATRICARIIFOLIUM (MATRICARY GRAPEFERN)
	NON		1998	1	BOTRYCHIUM MICHIGANENSE ()
	SPC	G4	1993	3	BOTRYCHIUM MINGANENSE (MINGAN MOONWORT)
	END	G2G3	2000	3	BOTRYCHIUM PALLIDUM (PALE MOONWORT)
	THR	G3	1999	5	BOTRYCHIUM RUGULOSUM (ST. LAWRENCE GRAPEFERN)
	SPC	G5	2000	3	BOTRYCHIUM SIMPLEX (LEAST MOONWORT)
	SPC	G3Q	2000	3	CALAMAGROSTIS LACUSTRIS (MARSH REEDGRASS)
	SPC	G5	2000	2	CAREX EXILIS (COASTAL SEDGE)
	SPC	G5	2000	6	CAREX FLAVA (YELLOW SEDGE)
	NON	G5	2000	22	CAREX GYNANDRA (A SPECIES OF SEDGE)
	NON	G5?	2000	8	CAREX MEDIA (INTERMEDIATE SEDGE)
	SPC	G5	2000	6	CAREX MICHAUXIANA (MICHAUX'S SEDGE)
	NON	G4	1999	1	CAREX ORMOSTACHYA (NECKLACE SPIKE SEDGE)
	END	G5	1993	1	CAREX PALLESCENS (PALE SEDGE)
	SPC	G5	1979	1	CAREX PRATICOLA (PRAIRIE SEDGE)
	SPC	G5	2000	1	CAREX SCIRPOIDEA (NORTHERN SINGLESPIKE SEDGE)
	SPC	G5	1954	1	CLADIUM MARISCOIDES (TWIG-RUSH)
	SPC	G5	2000	43	CLAYTONIA CAROLINIANA (CAROLINA SPRING-BEAUTY)
	THR	G5	2000	16	CRATAEGUS DOUGLASII (BLACK HAWTHORN)
	THR	G3	1994	3	CYPRIPEDIUM ARIETINUM (RAM'S-HEAD LADY'S-SLIPPER)
	SPC	G4	2000	20	DRABA ARABISANS (ROCK WHITLOW-GRASS)
	SPC	G5	2000	1	DROSERA ANGLICA (ENGLISH SUNDEW)
	THR	G3G4	2000	12	ELEOCHARIS NITIDA (NEAT SPIKE-RUSH)
	SPC	G5?	2000	19	EUPHRASIA HUDSONIANA (HUDSON BAY EYEBRIGHT)
	NON	G5	1999	28	GEOCAULON LIVIDUM (NORTHERN COMANDRA)
	NON	G5	1999	3	JUNCUS BRACHYCEPHALUS (SHORT-HEADED RUSH)
	SPC	G5T5	2000	3	JUNCUS STYGIUS VAR. AMERICANUS (BOG RUSH)
	SPC	G5	2000	11	JUNIPERUS HORIZONTALIS (CREEPING JUNIPER)
	END	G3	2000	2	LISTERA AURICULATA (AURICLED TWAYBLADE)
	SPC	G5	1999	8	LITTORELLA UNIFLORA (AMERICAN SHORE-PLANTAIN)
	SPC	G5T5	1941	1	LUZULA PARVIFLORA SSP. MELANOCARPA (SMALL-FLOWERED WOODRUSH)
	THR	G4	2000	3	MOEHRINGIA MACROPHYLLA (LARGE-LEAVED SANDWORT)
	SPC	G5	1987	1	MUHLENBERGIA UNIFLORA (ONE FLOWERED MUHLY)
	NON	G5	2000	4	MYRIOPHYLLUM TENELLUM (LEAFLESS WATER MILFOIL)
	THR	G5	1997	4	NYMPHAEA LEIBERGII (SMALL WHITE WATER-LILY)
	SPC	G5	2000	14	PINGUICULA VULGARIS (BUTTERWORT)
	SPC	G5	1999	10	PLATANTHERA CLAVELLATA (CLUB-SPUR ORCHID)
	SPC	G4	2000	2	POA WOLFII (WOLF'S BLUEGRASS)
	SPC	G5	2000	3	POLYGONUM VIVIPARUM (ALPINE BISTORT)
	END	G5	2000	8	POLYSTICHUM BRAUNII (BRAUN'S HOLLY FERN)
	SPC	G4	1997	2	POTAMOGETON VASEYI (VASEY'S PONDWEED)
	SPC	G5	2000	3	PYROLA MINOR (SMALL SHINLEAF)
	NON	G5	2000	2	RANUNCULUS GMELINI (SMALL YELLOW WATER CROWFOOT)

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Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					PLANTS
	SPC	G5	1999	4	RANUNCULUS LAPPONICUS (LAPLAND BUTTERCUP)
	SPC	G4G5	2000	8	RHYNCHOSPORA FUSCA (SOOTY-COLORED BEAK-RUSH)
	THR	G5	1996	2	RUBUS CHAMAEMORUS (CLOUDBERRY)
	END	G5TU	2000	2	SAGINA NODOSA SSP. BOREALIS (KNOTTY PEARLWORT)
	SPC	G5	1957	1	SALIX PELLITA (SATINY WILLOW)
	THR	G5	2000	6	SAXIFRAGA PANICULATA (ENCRUSTED SAXIFRAGE)
	SPC	G4?	1998	9	SPARGANIUM GLOMERATUM (CLUSTERED BUR-REED)
	THR	G5	1991	3	SUBULARIA AQUATICA (AWLWORT)
	END	G5	1999	2	TOFIELDIA PUSILLA (SMALL FALSE ASPHODEL)
	SPC	G3G5	1976	2	TOMENTHYPNUM FALCIFOLIUM (A SPECIES OF MOSS)
	SPC	G5?	2000	12	TORREYOCHLOA PALLIDA (TORREY'S MANNA-GRASS)
	SPC	G5T5	2000	1	TRIMORPHA ACRIS VAR. ASTEROIDES (BITTER FLEABANE)
	SPC	G4	1987	3	UTRICULARIA RESUPINATA (LAVENDAR BLADDERWORT)
	THR	G5	1992	3	VIOLA LANCEOLATA (LANCE-LEAVED VIOLET)
	SPC	G5	1997	2	WALDSTEINIA FRAGARIOIDES (BARREN STRAWBERRY)
	SPC	G4	1999	4	WOODSIA ALPINA (ALPINE WOODSIA)
	THR	G5	2000	9	WOODSIA GLABELLA (SMOOTH WOODSIA)
	SPC	G4	2000	6	XYRIS MONTANA (MONTANE YELLOW-EYED GRASS)

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Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
			1978	3	ASPEN-BIRCH FOREST
			1978	2	BLACK ASH SWAMP
			1978	1	BLACK SPRUCE SWAMP
			1978	1	BLACK SPRUCE-FEATHERMOSS FOREST
			1971	1	JACK PINE FOREST (NORTHEAST)
			1988	1	LAKE BEACH (LAKE SUPERIOR) SAND SUBTYPE
			1984	4	NORTHERN HARDWOOD FOREST (NORTHERN)
				1	OAK FOREST (NORTHEAST) RED MAPLE SUBTYPE
			1982	2	POOR FEN SEDGE SUBTYPE
			1991	13	RED PINE FOREST
			1971	2	SPRUCE-FIR FOREST
			1990	5	WHITE CEDAR SWAMP
			1993	9	WHITE PINE FOREST (NORTHEAST)
					ANIMAL AGGREGATIONS
			1985	1	BAT CONCENTRATION
			1999	53	COLONIAL WATERBIRD NESTING SITE
					ANIMALS
	NON	G5	1999	1	ACCIPITER GENTILIS (NORTHERN GOSHAWK)
	SPC	G3	1998	43	ACIPENSER FULVESCENS (LAKE STURGEON)
	NON	G5	1990	2	AEGOLIUS FUNEREUS (BOREAL OWL)
	SPC	G5	1993	1	AMMODRAMUS NELSONI (NELSON'S SHARP-TAILED SPARROW)
	NON	G5	2000	1	BARTRAMIA LONGICAUDA (UPLAND SANDPIPER)
	NON	G4	1993	27	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	THR	G4	2000	9	CICINDELA DENIKEI (A SPECIES OF TIGER BEETLE)
	SPC	G5T4	1974	2	CICINDELA HIRTICOLLIS RHODENSIS (A SPECIES OF TIGER BEETLE)
	THR	G4	2000	90	CLEMMYS INSCULPTA (WOOD TURTLE)
	SPC	G3	1997	3	COREGONUS KIYI (KIYI)
	SPC	G2	1993	1	COREGONUS ZENITHICUS (SHORTJAW CISCO)
	SPC	G4	1993	4	COTURNICOPS NOVEBORACENSIS (YELLOW RAIL)
	NON	G5	1996	7	DENDROICA CAERULESCENS (BLACK-THROATED BLUE WARBLER)
	THR	G4	1998	5	EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)
	SPC	G5T5	1982	1	EREBIA DISA MANCINUS (DISA ALPINE)
	THR	G4	1994	3	FALCO PEREGRINUS (PEREGRINE FALCON)
LT	SPC	G4	2001	173	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G5	2000	1	HEMIDACTYLIUM SCUTATUM (FOUR-TOED SALAMANDER)
	SPC	G4	2000	8	ICHTHYOMYZON FOSSOR (NORTHERN BROOK LAMPREY)
	SPC	G5	1998	5	LASMIGONA COMPRESSA (CREEK HEELSPLITTER MUSSEL)
	SPC	G5	1998	5	LIGUMIA RECTA (BLACK SANDSHELL MUSSEL)
	SPC	G4	1983	1	MYOTIS SEPTENTRIONALIS (NORTHERN MYOTIS)
	SPC	G3	1941	1	NOTROPIS ANOGENUS (PUGNOSE SHINER)
	THR	G5	1997	1	STERNA HIRUNDO (COMMON TERN)
	NON	G5	2001	6	STRIX NEBULOSA (GREAT GRAY OWL)
					PLANTS
	NON	G5	2000	12	ACTAEA PACHYPODA (WHITE BANEBERRY)
	SPC	G5	2000	12	ADOXA MOSCHATELLINA (MOSCHATEL)

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					PLANTS
	NON	G5	1998	1	AGROSTIS HYEMALIS (TICKLEGRASS)
	THR	G5T5	1953	2	ALLIUM SCHOENOPRASUM VAR. SIBIRICUM (WILD CHIVES)
	THR	G5	2000	3	AMMOPHILA BREVILIGULATA (BEACH GRASS)
	NON	G4	1997	15	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	NON	G5	1953	7	BIDENS DISCOIDEA (BUR-MARIGOLD)
	NON	G1	1998	1	BOTRYCHIUM ACUMINATUM (POINTED MOONWORT)
	SPC	G3	1998	1	BOTRYCHIUM CAMPESTRE (PRAIRIE MOONWORT)
	THR	G5	1992	1	BOTRYCHIUM LANCEOLATUM (TRIANGLE MOONWORT)
	THR	G5	1993	1	BOTRYCHIUM LUNARIA (COMMON MOONWORT)
	NON	G5	1998	16	BOTRYCHIUM MATRICARIIFOLIUM (MATRICARY GRAPEFERN)
	NON		1998	4	BOTRYCHIUM MICHIGANENSE ()
	SPC	G4	1993	3	BOTRYCHIUM MINGANENSE (MINGAN MOONWORT)
	SPC	G3	1996	2	BOTRYCHIUM MORMO (GOBLIN FERN)
	END	G2G3	1998	6	BOTRYCHIUM PALLIDUM (PALE MOONWORT)
	THR	G3	1998	1	BOTRYCHIUM RUGULOSUM (ST. LAWRENCE GRAPEFERN)
	SPC	G5	1999	12	BOTRYCHIUM SIMPLEX (LEAST MOONWORT)
	SPC	G3Q	1889	1	CALAMAGROSTIS LACUSTRIS (MARSH REEDGRASS)
	SPC	G5	1956	1	CALLITRICHE HETEROPHYLLA (LARGER WATER-STARWORT)
	END	G4G5	1999	17	CALTHA NATANS (FLOATING MARSH-MARIGOLD)
	NON	G5T5	1954	1	CARDAMINE PRATENSIS VAR. PALUSTRIS (CUCKOO FLOWER)
	SPC	G5	1979	2	CAREX EXILIS (COASTAL SEDGE)
	SPC	G5	1996	1	CAREX FLAVA (YELLOW SEDGE)
	THR	G4	1947	1	CAREX GARBERI (GARBER'S SEDGE)
	THR	G2G3Q	1984	13	CAREX KATAHDINENSIS (KATAHDIN SEDGE)
	NON	G4	1992	6	CAREX ORMOSTACHYA (NECKLACE SPIKE SEDGE)
	END	G5	1998	1	CAREX PALLESCENS (PALE SEDGE)
	SPC	G5	2000	19	CLAYTONIA CAROLINIANA (CAROLINA SPRING-BEAUTY)
	THR	G5	1999	8	CRASSULA AQUATICA (PIGMYWEED)
	THR	G3	1991	1	CYPRIPEDIUM ARIETINUM (RAM'S-HEAD LADY'S-SLIPPER)
	SPC	G5	1998	1	DESCHAMPSIA FLEXUOSA (SLENDER HAIRGRASS)
	NON	G5	1999	5	ELATINE TRIANDRA (THREE STAMENED WATERWORT)
	THR	G3G4	1998	3	ELEOCHARIS NITIDA (NEAT SPIKE-RUSH)
	SPC	G5	1950	1	ELEOCHARIS QUINQUEFLORA (FEW-FLOWERED SPIKE-RUSH)
	SPC	G5?	1941	1	EUPHRASIA HUDSONIANA (HUDSON BAY EYEBRIGHT)
	NON	G5	1993	4	GEOCAULON LIVIDUM (NORTHERN COMANDRA)
	SPC	G5	2000	5	HUDSONIA TOMENTOSA (BEACH-HEATHER)
	NON	G5	1950	3	JUNCUS BRACHYCEPHALUS (SHORT-HEADED RUSH)
	SPC	G5	1955	1	JUNIPERUS HORIZONTALIS (CREEPING JUNIPER)
	END	G3	1945	1	LISTERA AURICULATA (AURICLED TWAYBLADE)
	SPC	G5	1997	20	LITTORELLA UNIFLORA (AMERICAN SHORE-PLANTAIN)
	SPC	G4T4	1956	2	MALAXIS MONOPHYLLOS VAR. BRACHYPODA (WHITE ADDER'S-MOUTH)
	NON	G5	1997	1	MYRIOPHYLLUM HETEROPHYLLUM (BROADLEAF WATER-MILFOIL)
	NON	G5	1999	16	MYRIOPHYLLUM TENELLUM (LEAFLESS WATER MILFOIL)
	SPC	G5?	1999	1	NAJAS GRACILLIMA (SLENDER NAIAD)
	SPC	G5	1951	1	PHACELIA FRANKLINII (FRANKLIN'S PHACELIA)
	SPC	G5	1993	1	PLATANTHERA CLAVELLATA (CLUB-SPUR ORCHID)
	NON	G5	1939	1	POA SYLVESTRIS (WOODLAND BLUEGRASS)
	END	G5?T1Q	1999	3	POLEMONIUM OCCIDENTALE SSP. LACUSTRE (WESTERN JACOB'S LADDER)

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					PLANTS
	SPC	G5	1959	1	POLYGONUM VIVIPARUM (ALPINE BISTORT)
	NON	G4	1999	2	POTAMOGETON OAKESIANUS (OAKES' PONDWEED)
	SPC	G5	1957	5	POTAMOGETON VAGINATUS (SHEATHED PONDWEED)
	SPC	G4	1999	25	POTAMOGETON VASEYI (VASEY'S PONDWEED)
	NON	G5	1998	3	RANUNCULUS GMELINI (SMALL YELLOW WATER CROWFOOT)
	SPC	G5	1998	5	RANUNCULUS LAPPONICUS (LAPLAND BUTTERCUP)
	SPC	G4G5	1983	4	RHYNCHOSPORA FUSCA (SOOTY-COLORED BEAK-RUSH)
	NON	G5	1982	1	SAGITTARIA GRAMINEA (GRASS-LIKE ARROWHEAD)
	SPC	G5	1955	1	SALIX PELLITA (SATINY WILLOW)
	NON	G4	1953	1	SCIRPUS PEDICELLATUS (WOOLGRASS)
	SPC	G4?	1999	37	SPARGANIUM GLOMERATUM (CLUSTERED BUR-REED)
	THR	G5	1992	8	SUBULARIA AQUATICA (AWLWORT)
	SPC	G3G5	1976	2	TOMENTHYPNUM FALCIFOLIUM (A SPECIES OF MOSS)
	SPC	G5?	1998	3	TORREYOCHLOA PALLIDA (TORREY'S MANNA-GRASS)
	NON	G5	1983	1	TRIGLOCHIN PALUSTRIS (MARSH ARROW-GRASS)
	SPC	G5	2000	7	TSUGA CANADENSIS (EASTERN HEMLOCK)
	NON	G5	1999	8	UTRICULARIA GIBBA (HUMPED BLADDERWORT)
	SPC	G5	2001	5	WALDSTEINIA FRAGARIOIDES (BARREN STRAWBERRY)
	SPC	G4	1982	5	XYRIS MONTANA (MONTANE YELLOW-EYED GRASS)

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Element Occurrence Records

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
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Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
				1	BLACK SPRUCE BOG INTERMEDIATE SUBTYPE
			1992	4	NORTHERN HARDWOOD FOREST (NORTHERN)
			1996	1	WHITE PINE FOREST (NORTHEAST)
					ANIMAL AGGREGATIONS
			1992	2	COLONIAL WATERBIRD NESTING SITE
					ANIMALS
	NON	G5	1999	2	ACCIPITER GENTILIS (NORTHERN GOSHAWK)
	SPC	G3	1989	1	ACIPENSER FULVESCENS (LAKE STURGEON)
	THR	G5	1998	4	ACTINONAIAS LIGAMENTINA (MUCKET MUSSEL)
	THR	G4	1998	2	ALASMIDONTA MARGINATA (ELKTOE MUSSEL)
	NON	G5	1992	1	BARTRAMIA LONGICAUDA (UPLAND SANDPIPER)
	NON	G4	1993	2	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	THR	G4	2000	12	CLEMMYS INSCULPTA (WOOD TURTLE)
	THR	G4	1991	1	EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)
	NON	G4G5TU	1975	1	EPIDEMIA EPIXANTHE MICHIGANENSIS (BOG COPPER BUTTERFLY)
	NON	G5	1995	6	GRUS CANADENSIS (SANDHILL CRANE)
LT	SPC	G4	2000	5	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G5	2000	4	HEMIDACTYLIUM SCUTATUM (FOUR-TOED SALAMANDER)
	SPC	G4	2000	6	ICHTHYOMYZON FOSSOR (NORTHERN BROOK LAMPREY)
	SPC	G5	2000	2	ICHTHYOMYZON GAGEI (SOUTHERN BROOK LAMPREY)
	SPC	G5	1998	3	LASMIGONA COSTATA (FLUTED-SHELL MUSSEL)
	SPC	G5	1998	4	LIGUMIA RECTA (BLACK SANDSHELL MUSSEL)
	SPC		1975	1	MARPISSA GRATA (A SPECIES OF JUMPING SPIDER)
					PLANTS
	NON	G5	1996	5	ACTAEA PACHYPODA (WHITE BANEBERRY)
	SPC	G5	1940	1	ADOXA MOSCHATELLINA (MOSCHATEL)
	THR	G5T5	1996	2	ALLIUM SCHOENOPRASUM VAR. SIBIRICUM (WILD CHIVES)
	NON	G4	1981	1	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	THR	G5	1996	2	BOTRYCHIUM LANCEOLATUM (TRIANGLE MOONWORT)
	NON	G5	1996	2	BOTRYCHIUM MATRICARIIFOLIUM (MATRICARY GRAPEFERN)
	END	G4Q	1996	1	BOTRYCHIUM ONEIDENSE (BLUNT-LOBED GRAPEFERN)
	THR	G3	1997	1	BOTRYCHIUM RUGULOSUM (ST. LAWRENCE GRAPEFERN)
	NON	G5	1996	4	CAREX GYNANDRA (A SPECIES OF SEDGE)
	NON	G4	1996	2	CAREX ORMOSTACHYA (NECKLACE SPIKE SEDGE)
	NON	G4?	1997	1	CERATOPHYLLUM ECHINATUM (SPINY HORNWORT)
	SPC	G5	1997	1	CLADIUM MARISCOIDES (TWIG-RUSH)
	NON	G5	1997	2	ELATINE TRIANDRA (THREE STAMENED WATERWORT)
	SPC	G5T5	1981	1	JUNCUS STYGIUS VAR. AMERICANUS (BOG RUSH)
	SPC	G5	1997	1	LITTORELLA UNIFLORA (AMERICAN SHORE-PLANTAIN)
	NON	G5	1998	7	MYRIOPHYLLUM TENELLUM (LEAFLESS WATER MILFOIL)
	SPC	G5?	1997	9	NAJAS GRACILLIMA (SLENDER NAIAD)
	SPC	G4	1940	1	POLYGONUM CAREYI (CAREY'S SMARTWEED)
	SPC	G4	1997	12	POTAMOGETON VASEYI (VASEY'S PONDWEED)
	SPC	G4?	1997	11	SPARGANIUM GLOMERATUM (CLUSTERED BUR-REED)
	SPC	G5	1981	4	TSUGA CANADENSIS (EASTERN HEMLOCK)

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN CARLTON COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)

PLANTS

ELEMENTS PRINTED = 42

Minnesota Natural Heritage Database
Element Occurrence Records

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN KOOCHICHING COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
			1977	1	BLACK SPRUCE BOG RAISED SUBTYPE
			1992	1	RED PINE FOREST
				1	WHITE CEDAR SWAMP
			1992	2	WHITE PINE FOREST (NORTHEAST)
					ANIMAL AGGREGATIONS
			1993	17	COLONIAL WATERBIRD NESTING SITE
					ANIMALS
	NON	G5	1999	1	ACCIPITER GENTILIS (NORTHERN GOSHAWK)
	SPC	G3	1996	9	ACIPENSER FULVESCENS (LAKE STURGEON)
	NON	G5	1982	1	BARTRAMIA LONGICAUDA (UPLAND SANDPIPER)
	NON	G4	1993	21	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	NON	G5	1993	2	GRUS CANADENSIS (SANDHILL CRANE)
LT	SPC	G4	2001	26	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G4	1995	7	ICHTHYOMYZON FOSSOR (NORTHERN BROOK LAMPREY)
	SPC	G5	1998	6	LASMIGONA COMPRESSA (CREEK HEELSPLITTER MUSSEL)
	SPC	G5	1998	15	LIGUMIA RECTA (BLACK SANDSHELL MUSSEL)
	SPC	G4	1978	1	SYNAPTOMYS BOREALIS (NORTHERN BOG LEMMING)
					PLANTS
	NON	G4	1984	5	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	NON	G5	1984	1	CAREX CAPILLARIS VAR. MAJOR (HAIR-LIKE SEDGE)
	SPC	G5	1984	4	CAREX EXILIS (COASTAL SEDGE)
	THR	G4	1984	2	CAREX STERILIS (STERILE SEDGE)
	SPC	G5	1984	7	CLADIUM MARISCOIDES (TWIG-RUSH)
	THR	G3	1992	1	CYPRIPEDIUM ARIETINUM (RAM'S-HEAD LADY'S-SLIPPER)
	SPC	G5	1984	14	DROSERA ANGLICA (ENGLISH SUNDEW)
	SPC	G4	1984	6	DROSERA LINEARIS (LINEAR-LEAVED SUNDEW)
	THR	G5	1983	3	ELEOCHARIS ROSTELLATA (BEAKED SPIKE-RUSH)
	SPC	G5T5	1983	5	JUNCUS STYGIUS VAR. AMERICANUS (BOG RUSH)
	THR	G5	1983	4	RHYNCHOSPORA CAPILLACEA (HAIR-LIKE BEAK-RUSH)
	SPC	G4G5	1978	2	RHYNCHOSPORA FUSCA (SOOTY-COLORED BEAK-RUSH)
	SPC	G5?	1998	1	SALIX MACCALLIANA (MCCALL'S WILLOW)
	SPC	G3G5	1982	4	TOMENTHYPNUM FALCIFOLIUM (A SPECIES OF MOSS)
	NON	G5	1983	5	TRIGLOCHIN PALUSTRIS (MARSH ARROW-GRASS)
	SPC	G4	1978	3	XYRIS MONTANA (MONTANE YELLOW-EYED GRASS)

ELEMENTS PRINTED = 31

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN LAKE OF THE WOODS COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
			1979	1	ASPEN-BIRCH FOREST
				1	BLACK SPRUCE BOG RAISED SUBTYPE
				1	OPEN SPHAGNUM BOG
					ANIMAL AGGREGATIONS
			1998	15	COLONIAL WATERBIRD NESTING SITE
					ANIMALS
	SPC	G3	1992	2	ACIPENSER FULVESCENS (LAKE STURGEON)
	SPC	G5	1993	6	ASIO FLAMMEUS (SHORT-EARED OWL)
	NON	G4	1992	2	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
LT	END	G3	1993	5	CHARADRIUS MELODUS (PIPING PLOVER)
	SPC	G4	1984	2	COTURNICOPS NOVEBORACENSIS (YELLOW RAIL)
	NON	G5	1989	9	GRUS CANADENSIS (SANDHILL CRANE)
LT	SPC	G4	2000	19	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G4	1998	2	ICHTHYOMYZON FOSSOR (NORTHERN BROOK LAMPREY)
	SPC	G3	1997	5	PELECANUS ERYTHRORHYNCHOS (AMERICAN WHITE PELICAN)
	THR	G5	1988	2	PHALAROPUS TRICOLOR (WILSON'S PHALAROPE)
	THR	G5	1997	6	STERNA HIRUNDO (COMMON TERN)
					PLANTS
	NON	G4	1993	3	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	THR	G5	1894	1	BOTRYCHIUM LUNARIA (COMMON MOONWORT)
	SPC	G4	1979	2	BOTRYCHIUM MINGANENSE (MINGAN MOONWORT)
	THR	G3	1992	2	CYPRIPEDIUM ARIETINUM (RAM'S-HEAD LADY'S-SLIPPER)
	SPC	G5	1984	2	DROSERA ANGLICA (ENGLISH SUNDEW)
	SPC	G4	1984	2	DROSERA LINEARIS (LINEAR-LEAVED SUNDEW)
	SPC	G5T5	1939	1	GENTIANELLA AMARELLA SSP. ACUTA (FELWORT)
	NON	G5	1979	2	GEOCAULON LIVIDUM (NORTHERN COMANDRA)
	SPC	G5	1979	1	JUNIPERUS HORIZONTALIS (CREEPING JUNIPER)
	SPC	G4T4	1979	1	MALAXIS MONOPHYLLOS VAR. BRACHYPODA (WHITE ADDER'S-MOUTH)
	SPC	G5	1894	1	MINUARTIA DAWSONENSIS (ROCK SANDWORT)
	THR	G5	1984	10	NYMPHAEA LEIBERGII (SMALL WHITE WATER-LILY)

ELEMENTS PRINTED = 27

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN ROSEAU COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
			1992	4	BLACK SPRUCE SWAMP
			1991	2	CALCAREOUS SEEPAGE FEN BOREAL SUBTYPE
			1992	1	DRY OAK SAVANNA (NORTHWEST) SAND-GRAVEL SUBTYPE
			1970	2	JACK PINE FOREST (NORTHWEST)
			1991	1	LOWLAND HARDWOOD FOREST
			1990	1	MESIC BRUSH PRAIRIE
			1992	3	RICH FEN (BOREAL)
			1991	1	RICH FEN (TRANSITION)
			1991	3	RICH FEN (TRANSITION) SEDGE SUBTYPE
			1992	1	TAMARACK SWAMP
			1991	4	WET BRUSH PRAIRIE
			1991	1	WET MEADOW
			1992	7	WHITE CEDAR SWAMP
					ANIMAL AGGREGATIONS
			1995	3	COLONIAL WATERBIRD NESTING SITE
	SPC	G5	1990	4	GRUS CANADENSIS MIGRATORY ROOST
					ANIMALS
	SPC	G3	1948	2	ACIPENSER FULVESCENS (LAKE STURGEON)
	END	G4	1991	1	AMMODRAMUS BAIRDII (BAIRD'S SPARROW)
	SPC	G5	2001	17	AMMODRAMUS NELSONI (NELSON'S SHARP-TAILED SPARROW)
	END	G4	1991	2	ANTHUS SPRAGUEII (SPRAGUE'S PIPIT)
	SPC	G5	1991	9	ASIO FLAMMEUS (SHORT-EARED OWL)
	NON	G5	1992	24	BARTRAMIA LONGICAUDA (UPLAND SANDPIPER)
	NON	G4	1995	40	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	SPC	G4	2001	20	COTURNICOPS NOVEBORACENSIS (YELLOW RAIL)
	NON	G4G5TU	1991	4	EPIDEMIA EPIXANTHE MICHIGANENSIS (BOG COPPER BUTTERFLY)
	NON	G5	1992	56	GRUS CANADENSIS (SANDHILL CRANE)
LT	SPC	G4	2000	6	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	SPC	G4T4	1991	1	HESPERIA LEONARDUS LEONARDUS (LEONARD'S SKIPPER)
	SPC	G4	1996	1	ICHTHYOMYZON FOSSOR (NORTHERN BROOK LAMPREY)
	SPC	G5	1995	33	LIMOSA FEDOA (MARBLED GODWIT)
	SPC		1966	1	MARPISSA GRATA (A SPECIES OF JUMPING SPIDER)
	SPC	G5	1991	1	MICROTUS OCHROGASTER (PRAIRIE VOLE)
	SPC	G2G3	1991	2	OARISMA POWESHEIK (POWESHEIK SKIPPER)
	THR	G5	1992	3	PHALAROPUS TRICOLOR (WILSON'S PHALAROPE)
	THR	G5	1998	1	PODICEPS AURITUS (HORNED GREBE)
	THR	G5	1933	1	SPILOGALE PUTORIUS (EASTERN SPOTTED SKUNK)
	SPC	G4	1978	1	SYNAPTOMYS BOREALIS (NORTHERN BOG LEMMING)
					PLANTS
	THR	G5?	1983	1	ACHILLEA SIBIRICA (SIBERIAN YARROW)
	SPC	G5TU	1992	2	ANDROSACE SEPTENTRIONALIS SSP. PUBERULENTA (NORTHERN ANDROSACE)
	SPC	G5	1991	1	ANTENNARIA PARVIFOLIA (SMALL-LEAVED PUSSYTOES)
	NON	G4	1992	9	ARETHUSA BULBOSA (DRAGON'S-MOUTH)
	NON	G5	1992	8	CAREX CAPILLARIS VAR. MAJOR (HAIR-LIKE SEDGE)
	SPC	G5	1945	1	CAREX OBTUSATA (BLUNT SEDGE)

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN ROSEAU COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					PLANTS
	THR	G4	1991	3	CAREX STERILIS (STERILE SEDGE)
	SPC	G5	1992	2	CAREX XERANTICA (DRY SEDGE)
	SPC	G5	1992	12	CLADIUM MARISCOIDES (TWIG-RUSH)
	THR	G3	1992	18	CYPRIPEDIUM ARIETINUM (RAM'S-HEAD LADY'S-SLIPPER)
	SPC	G5	1991	8	DROSERA ANGLICA (ENGLISH SUNDEW)
	SPC	G4	1991	2	DROSERA LINEARIS (LINEAR-LEAVED SUNDEW)
	SPC	G5	1992	3	ELEOCHARIS QUINQUEFLORA (FEW-FLOWERED SPIKE-RUSH)
	SPC	G5	1990	2	GENTIANA AFFINIS (NORTHERN GENTIAN)
	NON	G5	1992	29	GEOCAULON LIVIDUM (NORTHERN COMANDRA)
	SPC	G5T5	1939	1	HELIANTHUS NUTTALLII SSP. RYDBERGII (NUTTALL'S SUNFLOWER)
	SPC	G4T4	1990	1	MALAXIS MONOPHYLLOS VAR. BRACHYPODA (WHITE ADDER'S-MOUTH)
	SPC	G5	1992	1	MINUARTIA DAWSONENSIS (ROCK SANDWORT)
	THR	G5	1992	4	NYMPHAEA LEIBERGII (SMALL WHITE WATER-LILY)
	SPC	G5	1992	4	RANUNCULUS LAPPONICUS (LAPLAND BUTTERCUP)
	THR	G5	1991	2	RHYNCHOSPORA CAPILLACEA (HAIR-LIKE BEAK-RUSH)
	SPC	G5?	1992	3	SALIX MACCALLIANA (MCCALL'S WILLOW)
	NON	G5	1991	2	TRIGLOCHIN PALUSTRIS (MARSH ARROW-GRASS)

ELEMENTS PRINTED = 59

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN KITTSON COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					NATURAL COMMUNITIES
			1991	1	ASPEN FOREST
			1992	3	ASPEN OPENINGS
			1990	2	ASPEN WOODLAND
			1989	1	DRY OAK SAVANNA (NORTHWEST) BARRENS SUBTYPE
			1992	5	DRY OAK SAVANNA (NORTHWEST) SAND-GRAVEL SUBTYPE
			1991	3	DRY PRAIRIE (NORTHWEST) BARRENS SUBTYPE
			1991	11	DRY PRAIRIE (NORTHWEST) SAND-GRAVEL SUBTYPE
			1992	18	MESIC BRUSH PRAIRIE
			1998	5	MESIC PRAIRIE (NORTHWEST)
			1992	2	MIXED EMERGENT MARSH (PRAIRIE)
			1992	2	OAK WOODLAND-BRUSHLAND (NORTHWEST)
			1992	12	RICH FEN (TRANSITION) SEDGE SUBTYPE
			1990	2	RICH FEN (TRANSITION) SHRUB SUBTYPE
		G4	1992	1	SHRUB SWAMP SEEPAGE SUBTYPE
			1998	15	WET BRUSH PRAIRIE
			1992	2	WET MEADOW
			1992	4	WET MEADOW SHRUB SUBTYPE
			1991	1	WET PRAIRIE (NORTHWEST) SALINE SUBTYPE
					ANIMAL AGGREGATIONS
			1985	1	COLONIAL WATERBIRD NESTING SITE
	SPC	G5	1992	7	GRUS CANADENSIS MIGRATORY ROOST
					ANIMALS
	SPC	G3	1990	5	ACIPENSER FULVESCENS (LAKE STURGEON)
	SPC	G5	1995	11	AMMODRAMUS NELSONI (NELSON'S SHARP-TAILED SPARROW)
	NON	G5	1992	64	BARTRAMIA LONGICAUDA (UPLAND SANDPIPER)
	NON	G4	1991	9	BOTAURUS LENTIGINOSUS (AMERICAN BITTERN)
	THR	G5T4	1981	2	CICINDELA FULGIDA WESTBOURNEI (A SPECIES OF TIGER BEETLE)
	SPC	G4	1992	16	COTURNICOPS NOVEBORACENSIS (YELLOW RAIL)
	NON	G5	2001	53	GRUS CANADENSIS (SANDHILL CRANE)
LT	SPC	G4	2000	2	HALIAEETUS LEUCOCEPHALUS (BALD EAGLE)
	END	G5T5	2000	6	HESPERIA COMMA ASSINIBOIA (ASSINIBOIA SKIPPER)
	THR	G2G3	2000	4	HESPERIA DACOTAE (DAKOTA SKIPPER)
	SPC	G5	1966	3	LIGUMIA RECTA (BLACK SANDSHELL MUSSEL)
	SPC	G5	1991	34	LIMOSA FEDOA (MARBLED GODWIT)
	THR	G5	1991	11	OARISMA GARITA (GARITA SKIPPER)
	SPC	G2G3	1992	12	OARISMA POWESHEIK (POWESHEIK SKIPPER)
	NON	G5	1955	1	ONYCHOMYS LEUCOGASTER (NORTHERN GRASSHOPPER MOUSE)
	THR	G5	1992	9	PHALAROPUS TRICOLOR (WILSON'S PHALAROPE)
	THR	G5	1995	1	PODICEPS AURITUS (HORNED GREBE)
	SPC	G5	2001	1	STERNA FORSTERI (FORSTER'S TERN)
	SPC	G5	1991	11	THOMOMYS TALPOIDES (NORTHERN POCKET GOPHER)
					PLANTS
	SPC	G5TU	1990	6	ANDROSACE SEPTENTRIONALIS SSP. PUBERULENTA (NORTHERN ANDROSACE)
	SPC	G5	1992	2	ANTENNARIA PARVIFOLIA (SMALL-LEAVED PUSSYTOES)
	THR	G5T5	1991	6	ARABIS HOLBOELLII VAR. RETROFRACTA (HOLBOELL'S ROCK-CRESS)

LIST OF KNOWN RARE FEATURES FROM THE NATURAL HERITAGE DATABASE
LOCATED IN KITTSON COUNTY, MN SORTED BY ELEMENT CLASS & ELEMENT NAME
MnDNR, Natural Heritage and Nongame Research Program

Federal Status	MN(legal) Status	Global Rank	Last Observed	# of Occurs.	Element Name (Common Name)
					PLANTS
	SPC	G3	1997	1	BOTRYCHIUM CAMPESTRE (PRAIRIE MOONWORT)
	END	G1	1998	1	BOTRYCHIUM GALLICOMONTANUM (FRENCHMAN'S BLUFF MOONWORT)
	NON	G5	1997	1	BOTRYCHIUM MATRICARIIFOLIUM (MATRICARY GRAPEFERN)
	SPC	G5	1997	2	BOTRYCHIUM SIMPLEX (LEAST MOONWORT)
	SPC	G5	1992	2	CALAMAGROSTIS MONTANENSIS (PLAINS REEDGRASS)
	NON	G5	1992	3	CAREX CAPILLARIS VAR. MAJOR (HAIR-LIKE SEDGE)
	THR	G4	1992	3	CAREX GARBERI (GARBER'S SEDGE)
	SPC	G4?Q	1992	5	CAREX HALLII (HALL'S SEDGE)
	SPC	G5	1992	12	CAREX OBTUSATA (BLUNT SEDGE)
	SPC	G5	1991	3	CAREX SCIRPOIDEA (NORTHERN SINGLESPIKE SEDGE)
	SPC	G5	1992	9	CAREX XERANTICA (DRY SEDGE)
	NON	G5	1990	1	CHAMAERHODOS NUTTALLII (NUTTALL'S GROUND-ROSE)
	SPC	G5	1992	8	CLADIUM MARISCOIDES (TWIG-RUSH)
	SPC	G4	1992	6	CYPRIPEDIUM CANDIDUM (SMALL WHITE LADY'S-SLIPPER)
	SPC	G5	1992	9	ELEOCHARIS QUINQUEFLORA (FEW-FLOWERED SPIKE-RUSH)
	SPC	G5	1982	6	GAILLARDIA ARISTATA (BLANKET-FLOWER)
	SPC	G5	1992	7	GENTIANA AFFINIS (NORTHERN GENTIAN)
	SPC	G5T5	1990	1	GENTIANELLA AMARELLA SSP. ACUTA (FELWORT)
	NON	G5	1959	1	GENTIANOPSIS MACOUNII (MACOUN'S GENTIAN)
	END	G5	1992	2	GLAUX MARITIMA (SEA MILKWORT)
	SPC	G5	1987	4	HELICTOTRICHON HOOKERI (OAT-GRASS)
	SPC	G5	1982	2	HUDSONIA TOMENTOSA (BEACH-HEATHER)
	NON	G5	1962	1	JUNCUS GERARDII (BLACK GRASS)
	SPC	G5	1983	4	JUNIPERUS HORIZONTALIS (CREEPING JUNIPER)
	SPC	G5	1959	2	LIMOSELLA AQUATICA (MUDWORT)
	SPC	G4	1987	3	OROBANCHE FASCICULATA (CLUSTERED BROOMRAPE)
	SPC	G5	1991	3	OROBANCHE LUDOVICIANA (LOUISIANA BROOMRAPE)
LT	END	G2	2001	4	PLATANTHERA PRAECLARA (WESTERN PRAIRIE FRINGED ORCHID)
	NON	G5	1991	1	POA ARIDA (BUNCH SPEARGRASS)
	NON	G5	1992	4	PUCCINELLIA NUTTALLIANA (ALKALI GRASS)
	THR	G4	1992	5	SALICORNIA RUBRA (RED SALTWORT)
	SPC	G5?	1992	2	SALIX MACCALLIANA (MCCALL'S WILLOW)
	SPC	G4	1989	3	SCIRPUS CLINTONII (CLINTON'S BULRUSH)
	SPC	G5	1992	5	SILENE DRUMMONDII (DRUMMOND'S CAMPION)
	NON	G5	1992	5	SPARTINA GRACILIS (ALKALI CORD-GRASS)
	SPC	G5	1992	9	STELLARIA LONGIPES (LONG-STALKED CHICKWEED)
	SPC	G5	1992	3	TRIMORPHA LONCHOPHYLLA (SHORTRAY FLEABANE)

ELEMENTS PRINTED = 79

Natural Heritage Database Print-outs: An Explanation of Selected Fields

The Natural Heritage database is maintained by the Natural Heritage and Nongame Research Program, a unit within the Section of Ecological Services, Department of Natural Resources. It is the most complete source of data on Minnesota's rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features, and is used in fostering better understanding and protection of these rare features. The information in the database is drawn from many parts of Minnesota, and is constantly being updated, but it is not based on a comprehensive survey of the state. Therefore, there are currently many significant natural features present in the state which are not represented by the database. We are in the process of addressing this problem via the Minnesota County Biological Survey, a county-by-county inventory of rare natural features, which is now underway.

Index

The Natural Heritage database maintains records of rare features, or "elements" in Minnesota. The records contain many fields which can be organized into variously formatted printouts. Each line in the enclosed abbreviated print-out, or index summary, represents the existence of a rare natural feature such as an endangered plant or animal, a native plant community, or an animal agregation site such as a waterbird colony. Your index is organized first by class, then by taxonomic group, and, finally, alphabetically by scientific name. The following fields are displayed:

FED STATUS: Status of species under the Federal Endangered Species Law. Codes are LE=endangered, LT=threatened, C=species which are candidates for listing due to sufficient information on biological vulnerability and threat(s), but which have not yet been officially designated as endangered or threatened.

MN STATUS: Minnesota legal status of plant and animal species under the State Endangered Species Law. Codes for status are as follows: END=endangered, THR=threatened, SPC=special concern. Additional species are tracked that have no legal status, but are rare and may become listed if they decline further; the code for these species is NON. This field is blank for natural communities and colonial waterbird nesting sites, which have no legal status in Minnesota, but are tracked by the database.

GLOBAL RANK: The importance of an element globally, with G1 reflecting critically imperiled due to extreme rarity on a world-wide basis and progressing up to G5 which reflects a demonstrably secure situation, though the element may be quite rare in parts of its range.

LAST OBSERVED: Indicates the date of the most recent record. This field can be used as an indicator of the likelihood that the element still exists in the area searched.

 # OF OCCURS.: The number of records in the database for each element within the area searched.

ELEMENT NAME (COMMON NAME): For plant and animal species this is the scientific name with the common name in parentheses; for all other elements it is the feature name.

DATA REQUESTS

The Heritage Database is updated continuously. Of particular significance is the body of new records being generated by the Minnesota County Biological Survey. For this reason, it is important to forward data requests to the Natural Heritage and Nongame Research Program. In addition, printouts can be organized by the data management staff to meet the particular needs of requesters. Requests for rare features data should be forwarded to Sharron Nelson at (651)296-8324 or Karen Cieminski at (651)296-8319.

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
New Mexico Ecological Field Services Field Office
Attn: Ms. Joy Nicholopoulos, Field Supervisor
2105 Osuna Road NE
Albuquerque, NM 87113-1001

Dear Ms. Nicholopoulos:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Dona Ana, Luna, and Hidalgo Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

80306045
Correspondence

November 26, 2001

Cons. # 2-22-02-I-107

Mr. William Fickel, Jr.
U.S. Army Corps of Engineers
Planning, Environmental, and Regulatory Division
P.O. Box 17300
Fort Worth, Texas 76102

Dear Mr. Fickel:

This responds to your October 22, 2001, letter requesting information on threatened or endangered species or important wildlife habitats that could be affected by the installation and operation of remote video surveillance systems in Doña Ana, Luna, and Hidalgo Counties, New Mexico.

We have enclosed a current list of federally-endangered, threatened, candidate species, and species of concern that may be found in Doña Ana, Luna, and Hidalgo Counties, New Mexico. Additional information about these species is available on the Internet at <http://nmrareplants.unm.edu>, <http://nmnhp.unm.edu/bisonm/bisonm.cfm>, and <http://ifw2es.fws.gov/endangeredspecies>. Under the Endangered Species Act, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" any threatened, endangered, or proposed species, or critical habitat, and if necessary, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be done during the appropriate flowering/breeding season to evaluate any possible project-related impacts.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We are required to monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys. Please keep in mind that the scope of federally-listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects.

Under Executive Order 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under Section 404 of the Clean Water Act if your proposed action could impact wetlands. These habitats should be conserved through avoidance or mitigated to ensure no net loss of wetlands functions and values.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and if necessary, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered species and New Mexico's wildlife habitats. If you have any questions after reviewing the websites listed above about how to avoid adverse affects to the species listed on the enclosed attachment, please contact Aimee Roberson at the letterhead address or at (505) 346-2525, ext. 112.

Sincerely,

Joy E Nicholopoulos

Joy E. Nicholopoulos
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Threatened, Endangered, and Candidate Species,
and Species of Concern
Doña Ana, Hidalgo, and Luna Counties
November 26, 2001

Doña Ana

Big free-tailed bat, Nyctinomops macrotis (=Tadarida m., T. molossa), SC
Desert pocket gopher, Geomys bursarius arenarius, SC
Fringed myotis, Myotis thysanodes, SC
Greater western mastiff bat, Eumops perotis californicus, SC
Occult little brown bat, Myotis lucifugus occultus, SC
Organ Mountains Colorado chipmunk, Eutamias quadrivittatus australis, SC
Townsend's big-eared bat, Corynorhinus townsendii, SC
Western red bat, Lasiurus blossevillii, SC
Pecos River muskrat, Ondatra zibethicus ripensis, SC
Spotted bat, Euderma maculatum, SC
White Sands woodrat, Neotoma micropus leucophaea, SC
American peregrine falcon, Falco peregrinus anatum, SC
Arctic peregrine falcon, Falco peregrinus tundrius, SC
Baird's sparrow, Ammodramus bairdii, SC
Bald eagle, Haliaeetus leucocephalus, T
Black tern, Chlidonias niger, SC
Ferruginous hawk, Buteo regalis, SC
Interior least tern, Sterna antillarum, E
Loggerhead shrike, Lanius ludovicianus, SC
Mexican spotted owl, Strix occidentalis lucida, T w/CH
Northern aplomado falcon, Falco femoralis septentrionalis, E
Southwestern willow flycatcher, Empidonax traillii extimus, E
Western burrowing owl, Athene cunicularia hypugaea, SC
White-faced ibis, Plegadis chihi, SC
Yellow-billed cuckoo, Coccyzus americanus, C
Rio Grande silvery minnow, Hybognathus amarus, E***
Desert viceroy butterfly, Limenitis archippus obsoleta, SC
Texas horned lizard, Phrynosoma cornutum, SC
Anthony blister beetle, Lytta mirifica, SC
Doña Ana talussnail, Sonorella todseni, SC
Alamo beardtongue, Penstemon alamosensis, SC
Desert night-blooming cereus, Cereus greggii var. greggii, SC
Mescalero milkwort, Polygala rimulicola var. mescalerorum, SC
Nodding rock-daisy, Perityle cernua, SC
Organ Mountain evening-primrose, Oenothera organensis, SC
Organ Mountain figwort, Scrophularia laevis, SC
Sand prickly pear, Opuntia arenaria, SC
Sandhill goosefoot, Chenopodium cycloides, SC
Sneed pincushion cactus, Coryphantha sneedii var. sneedii, E
Standley whitlow-grass, Draba standleyi, SC

Hidalgo

Arizona shrew, Sorex arizonae, SC
Big free-tailed bat, Nyctinomops macrotis (=Tadarida m., T. molossa), SC
Black-tailed prairie dog, Cynomys ludovicianus, C*
California leaf-nosed bat, Macrotus californicus, SC
Cave myotis, Myotis velifer, SC
Fringed myotis, Myotis thysanodes, SC
Greater western mastiff bat, Eumops perotis californicus, SC
Western red bat, Lasiurus blossevillii, SC
Western yellow bat, Lasiurus xanthinus, SC
Jaguar, Panthera onca, E
Lesser long-nosed bat, Leptonycteris curasoae yerbabuenae, E
Mearns' southern pocket gopher, Thomomys umbrinus mearnsi, SC
Mexican gray wolf, Canis lupus baileyi, E
Mexican long-nosed bat, Leptonycteris nivalis, E
Mexican long-tongued bat, Choeronycteris mexicana, SC
Occult little brown bat, Myotis lucifugus occultus, SC
Townsend's big-eared bat, Corynorhinus townsendii, SC
Spotted bat, Euderma maculatum, SC
White-sided jackrabbit, Lepus callotis gaillardi, SC
Yellow-nosed cotton rat, Sigmodon ochrognathus, SC
American peregrine falcon, Falco peregrinus anatum, SC
Arctic peregrine falcon, Falco peregrinus tundrius, SC
Baird's sparrow, Ammodramus bairdii, SC
Bald eagle, Haliaeetus leucocephalus, T
Ferruginous hawk, Buteo regalis, SC
Loggerhead shrike, Lanius ludovicianus, SC
Mexican spotted owl, Strix occidentalis lucida, T w/CH
Mountain plover, Charadrius montanus, PT
Northern aplomado falcon, Falco femoralis septentrionalis, E
Northern goshawk, Accipiter gentilis, SC
Northern gray hawk, Buteo nitidus maximus, SC
Southwestern willow flycatcher, Empidonax traillii extimus, E (**Note:** critical habitat on hold/set aside by 10th Circuit Court of Appeals, 5/17/01, until further notice)
Western burrowing owl, Athene cunicularia hypugaea, SC
Yellow-billed cuckoo, Coccyzus americanus, C
Desert sucker, Catostomus clarki, SC
Loach minnow, Rhinichthys cobitis, T w/CH
Longfin dace, Agosia chrysogaster, SC
Roundtail chub, Gila robusta, SC
Sonora sucker, Catostomus insignis, SC
Spikedace, Meda fulgida, T w/CH
Canyon (giant) spotted whiptail, Cnemidophorus burti, SC
Gray-checkered whiptail, Cnemidophorus dixoni, SC

Mexican garter snake, Thamnophis eques, SC
Narrowhead garter snake, Thamnophis rufipunctatus, SC
New Mexican ridge-nosed rattlesnake, Crotalus willardi obscurus, T w/CH
Texas horned lizard, Phrynosoma cornutum, SC
Chiricahua leopard frog, Rana chiricahuensis, PT
Lowland leopard frog, Rana yavapaiensis, SC
Animas minute moss beetle, Limnebius aridus, SC
Hacheta Grande woodlandsnail, Ashmunella hebardi, SC
Shortneck snaggletooth (snail), Gastrocopta dalliana dalliana, SC
Chiricahua mudwort, Limosella publiflora, SC
Contra yerba, Pediomelum pentaphyllum, SC
Coppermine milk-vetch, Astragalus cobrensis var. maguirei, SC
Desert night-blooming cereus, Cereus greggii var. greggii, SC
Griffith's saltbush, Atriplex griffithsii, SC
Gypsum hotspring aster, Machaeranthera gypsitherma, SC
Limestone rosewood, Vauquelinia californica ssp. pauciflora, SC
Ornate paintbrush, Castilleja ornata, SC
Parish's alkali grass, Puccinellia parishii, SC
San Carlos wild-buckwheat, Eriogonum capillare, SC

Luna

Cave myotis, Myotis velifer, SC
Desert pocket gopher, Geomys bursarius arenarius, SC
Fringed myotis, Myotis thysanodes, SC
Greater western mastiff bat, Eumops perotis californicus, SC
Mexican gray wolf, Canis lupus baileyi, E
Townsend's big-eared bat, Corynorhinus townsendii, SC
Spotted bat, Euderma maculatum, SC
White-sided jackrabbit, Lepus callotis gaillardi, SC
American peregrine falcon, Falco peregrinus anatum, SC
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Bald eagle, Haliaeetus leucocephalus, T
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Mountain plover, Charadrius montanus, PT
Northern aplomado falcon, Falco femoralis septentrionalis, E
Northern gray hawk, Buteo nitidus maximus, SC
Southwestern willow flycatcher, Empidonax traillii extimus, E
Western burrowing owl, Athene cunicularia hypugaea, SC
Yellow-billed cuckoo, Coccyzus americanus, C
Beautiful shiner, Cyprinella formosa, T***
Longfin dace, Agosia chrysogaster, SC
Rio Grande sucker, Catostomus plebeius, SC

Chiricahua leopard frog, Rana chiricahuensis, PT
Texas horned lizard, Phrynosoma cornutum, SC
Cook's Peak woodlandsnail, Ashmunella macromphala, SC
Florida mountainsnail, Oreohelix florida, SC
Shortneck snaggletooth (snail), Gastrocopta dalliana dalliana, SC
Desert night-blooming cereus, Cereus greggii var. greggii, SC
Sand prickly pear, Opuntia arenaria, SC

Index

E	=	Endangered (in danger of extinction throughout all or a significant portion of its range).
PE	=	Proposed Endangered
T	=	Threatened (likely to become endangered within the foreseeable future throughout all or a significant portion of its range).
PT	=	Proposed Threatened
CH	=	Critical Habitat
PCH	=	Proposed Critical Habitat
C	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
SC	=	Species of concern (taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies). Species of concern are included for planning purposes only.
S/A	=	Similarity of Appearance
*	=	Introduced population
†	=	May occur in this county from re-introductions in Colorado.
XN	=	Nonessential Experimental Population
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (*Cynomys gunnisoni*) and/or 80-acres or more for any subspecies of Black-tailed prairie dog (*Cynomys ludovicianus*). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.
***	=	Extirpated in this county

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

New Mexico Natural Heritage Program
University of New Mexico
Department of Biology
Attn: Mr. Chris Frazier, Information Manager
167 Castetter Hall
Albuquerque, NM 87131

Dear Mr. Frazier:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding state listed species potentially occurring within those counties along the border: Dona Ana, Luna, and Hidalgo Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO ATTENTION OF

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
Attn: Mr. Ernesto Reyes
Route 2, Box 202A
Alamo, TX 78516

Dear Mr. Reyes:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Cameron, Hidalgo, Starr, Zapata, and Webb Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

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Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300
October 18, 2001

REPLY TO
ATTENTION OF

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
Attn: Mr. Allen Strand, Field Supervisor
c/o TAMU-CC
Campus Box 338, 6300 Ocean Drive
Corpus Christi, TX 78412

Dear Mr. Strand:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Maverick County. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

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Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

October 18, 2001

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

U.S. Fish and Wildlife Service
Austin Ecological Field Services Field Office
Attn: Mr. Bill Seawell, Field Supervisor
Compass Bank Building,
10711 Burnet Road, Suite 200
Austin, TX 78758

Dear Mr. Seawell:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding Federally listed species potentially occurring within those counties along the border: Kinney, Val Verde, Terrell, Brewster, Presidio, Jeff Davis, Hudspeth, and El Paso Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

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Sincerely,

William Fickel, Jr.

William Fickel, Jr.
Planning, Environmental and
Regulatory

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

W
mH
FED-EB
8306045
Correspondence

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services - LRGV SubOffice
Phone: (956) 784-7560 Fax: (956) 787-0547
Rt. 2 Box 202-A
Alamo, TX 78516
November 15, 2001

Mr. William Fickel, Jr.
Department of the Army
Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

Consultation No. 2-11-02-ALI-008

Dear Mr. Fickel:

This responds to your letter received October 22, 2001, requesting current information on species federally listed or proposed for listing as threatened or endangered occurring within Cameron, Hidalgo, Starr, Zapata and Webb County, Texas. The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

The following list provides current information on federally-listed species for the above counties where your future projects will occur. The list may include endangered and threatened species, as well as proposed species, and species of concern. Proposed species are species of concern for which rules have been published in the Federal Register, nominating the species for threatened or endangered status. Species of concern have no protection under the Endangered Species Act of 1973, however, the Service has substantial information on species of concern to support their listing as threatened or endangered. The development and publication of proposed rules for listing species of concern are anticipated. Therefore, actions that might contribute to the listing of species of concern should be avoided. A letter designation follows the species name that represents the current federal status of the species. Within the list, the letters E, T, P and SOC, represents the status of Endangered, Threatened, Proposed and Species of Concern, respectively. The acronym CH, indicates that there is Critical Habitat associated with the species, and P(CH) indicates that Critical Habitat has been Proposed for the species.

Cameron County

ocelot (Felis pardalis) - E
jaguarundi (Felis Yagouaroundi) - E
West Indian manatee (Trichechus manatus) - E
Brown Pelican (Pelecanus occidentalis) - E
Northern aplomado falcon (Falco femoralis septentrionalis) - E
Hawksbill sea turtle (Eretmochelys imbricata) - E (w/CH)
Kemp's Ridley sea turtle (Lepidochelys kempii) - E
Leatherback sea turtle (Dermochelys coriacea) - E (w/CH)

Green sea turtle (_Chelonia mydas_) - T
Loggerhead sea turtle (_Caretta caretta_) - T
South Texas ambrosia (_Ambrosia cheiranthifolia_) - E
Texas ayenia (_Ayenia limitaris_) - E
Bald Eagle (_Haliaeetus leucocephalus_) - T
Piping plover (_Charadrius melodus_) - T (P/CH)
American alligator (_Alligator mississipiensis_) - TSA
Mountain plover (_Charadrius montanus_) - P/T
Audubon's oriole (_Icterus graduacauda audubonii_) - SOC
Black tern (_Chlidonias niger_) - SOC
Brownsville common yellowthroat (_Geothlypis trichas insperata_) - SOC
Cerulean warbler (_Dendroica cerula_) - SOC
Ferruginous hawk (_Buteo regalis_) - SOC
Loggerhead shrike (_Lanius ludovicianus_) - SOC
Northern gray hawk (_Buteo nitidus maximus_) - SOC
Reddish egret (_Egretta rufescens_) - SOC
Sennett's hooded oriole (_Icterus cucullatus sennetti_) - SOC
Texas Botteri's sparrow (_Aimophila botterii texana_) - SOC
Texas olive sparrow (_Arremonops rufivirgatus rufivigatus_) - SOC
Tropical parula (_Parula pitiayumi nigrilora_) - SOC
White-faced ibis (_Plegadis chichi_) - SOC
Coues' rice rat (_Oryzomys couesi aquaticus_) - SOC
Texas horned lizard (_Phrynosoma cornutum_) - SOC
Black-spotted newt (_Notophthalmus meridionalis_) - SOC
Rio Grande lesser siren (_Siren intermedia texana_) - SOC
Bailey's ballmoss (_Tillandsia baileyi_) - SOC
Lilia de los llanos (_Echeandia chandleri_) - SOC
Marshelder (slender) dodder (_Cuscuta attenuata_) - SOC
Runyon huaco (_Manfreda longiflora_) - SOC
Runyon's water-willow (_Justicia runyonii_) - SOC
Short-fruited spikerush (_Eleocharis brachycarpa_) - SOC

Hidalgo County

ocelot (_Felis pardalis_) - E
jaguarundi (_Felis Yagouaroundi_) - E
Northern aplomado falcon (_Falco femoralis septentrionalis_) - E
Texas ayenia (_Ayenia limitaris_) - E
Walker's manioc (_Manihot walkerae_) - E
Mountain plover (_Charadrius montanus_) - P/T
Audubon's oriole (_Icterus graduacauda audubonii_) - SOC
Brownsville common yellowthroat (_Geothlypis trichas insperata_) - SOC
Ferruginous hawk (_Buteo regalis_) - SOC
Loggerhead shrike (_Lanius ludovicianus_) - SOC
Northern gray hawk (_Buteo nitidus maximus_) - SOC
Sennett's hooded oriole (_Icterus cucullatus sennetti_) - SOC
Texas Botteri's sparrow (_Aimophila botterii texana_) - SOC
Texas olive sparrow (_Arremonops rufivirgatus rufivigatus_) - SOC
Tropical parula (_Parula pitiayumi nigrilora_) - SOC
White-faced ibis (_Plegadis chichi_) - SOC
Coues' rice rat (_Oryzomys couesi aquaticus_) - SOC
Reticulate collared lizard (_Crotaphytus reticulatus_) - SOC
Texas horned lizard (_Phrynosoma cornutum_) - SOC
Black-spotted newt (_Notophthalmus meridionalis_) - SOC
Rio Grande lesser siren (_Siren intermedia texana_) - SOC
Bailey's ballmoss (_Tillandsia baileyi_) - SOC
Falfurrias (milkvine) anglepod (_Matelea radiata_) - SOC
Runyon huaco (_Manfreda longiflora_) - SOC
Runyon's water-willow (_Justicia runyonii_) - SOC

Small papillosus (Echinocereus var. angusticeps) - SOC
Texas windmill-grass (Chloris texensis) - SOC
Subtropical blue-black tiger beetle (Cicindela nigrocoerula subtropica) - SOC
Maculated manfreda skipper (Stallingsia maculosus) - SOC

Starr County

ocelot (Felis pardalis) - E
jaguarundi (Felis Yagouaroundi) - E
Least tern (Sterna antillarum) - E
Ashy dogweed (Thymophylla tephroleuca) - E
Johnston's frankenia (Frankenia johnstonii) - E
Starr cactus (Astrophytum asterias)- E
Walker's manioc (Manihot walkerae) - E
Zapata bladderpod (Lesquerella thamnophila) - E (w/CH)
Audubon's oriole (Icterus graduacauda audubonii) - SOC
Brownsville common yellowthroat (Geothlypis trichas insperata) - SOC
Ferruginous hawk (Buteo regalis) - SOC
Loggerhead shrike (Lanius ludovicianus) - SOC
Northern gray hawk (Buteo nitidus maximus) - SOC
Sennett's hooded oriole (Icterus cucullatus sennetti) - SOC
Texas olive sparrow (Arremonops rufivirgatus rufivigatus) - SOC
Tropical parula (Parula pitiayumi nigrilora) - SOC
Coues' rice rat (Oryzomys couesi aquaticus) - SOC
Reticulate collared lizard (Crotaphytus reticulatus) - SOC
Texas horned lizard (Phrynosoma cornutum) - SOC
Rio Grande lesser siren (Siren intermedia texana) - SOC
Marble-seeded few-spined prickly-pear (Opuntia engelmannii var. flexospina) - SOC
Falfurrias (milkvine) anglepod (Matelea radiata) - SOC
Prostrate milkweed (Asclepias prostrata) - SOC
Runyon huaco (Manfreda longiflora) - SOC
Small papillosus (Echinocereus var. angusticeps) - SOC
Maculated manfreda skipper (Stallingsia maculosus) - SOC

Zapata County

ocelot (Felis pardalis) - E
jaguarundi (Felis Yagouaroundi) - E
Least tern (Sterna antillarum) - E
Ashy dogweed (Thymophylla tephroleuca) - E
Johnston's frankenia (Frankenia johnstonii) - E
Zapata bladderpod (Lesquerella thamnophila) - E (w/CH)
Audubon's oriole (Icterus graduacauda audubonii) - SOC
Loggerhead shrike (Lanius ludovicianus) - SOC
Northern gray hawk (Buteo nitidus maximus) - SOC
Texas olive sparrow (Arremonops rufivirgatus rufivigatus) - SOC
Reticulate collared lizard (Crotaphytus reticulatus) - SOC
Texas horned lizard (Phrynosoma cornutum) - SOC
Rio Grande lesser siren (Siren intermedia texana) - SOC
Correll's bluet (Hedyotis correllii) - SOC
Correll's false dragon-head (Physostegia correllii) - SOC
Dimmit sunflower (Helianthus praecox ssp. hirtus) - SOC
Marble-seeded few-spined prickly-pear (Opuntia engelmannii var. flexospina) - SOC
Prostrate milkweed (Asclepias prostrata) - SOC

Webb County

ocelot (Felis pardalis) - E
jaguarundi (Felis Yagouaroundi) - E

Least tern (Sterna antillarum) - E
Ashy dogweed (Thymophylla tephroleuca) - E
Johnston's frankenia (Frankenia johnstonii) - E
Mountain plover (Charadrius montanus) - P/T
Audubon's oriole (Icterus graduacauda audubonii) - SOC
Ferruginous hawk (Buteo regalis) - SOC
Loggerhead shrike (Lanius ludovicianus) - SOC
Northern gray hawk (Buteo nitidus maximus) - SOC
Sennett's hooded oriole (Icterus cucullatus sennetti) - SOC
Texas olive sparrow (Arremonops rufivirgatus rufivigatus) - SOC
Reticulate collared lizard (Crotaphytus reticulatus) - SOC
Texas horned lizard (Phrynosoma cornutum) - SOC
Rio Grande lesser siren (Siren intermedia texana) - SOC
MacCart's whitlow-wort (Paronychia maccartii) - SOC
Marble-seeded few-spined prickly-pear (Opuntia engelmannii var. flexospina) - SOC
Nickel's pincushion (cory) cactus (Coryphantha sulcata var. nickelsiae) - SOC

Ocelot and jaguarundi inhabit dense native brushland, generally occurring near watercourses, throughout South Texas. Population declines in both species of felids are primarily due to habitat loss associated with clearing of brush. Various species of wildlife also use brush for shelter, hunting areas, and as protected corridors for travel. Also, wildlife corridors are important for cats, so they can travel from one area to another for dispersal. The Service recommends minimal impacts due to brush clearing, or if major brush clearing would occur, that plant and animal surveys be conducted first.

Regarding other important fish and wildlife resources, please keep in mind that many bird species protected under the Migratory Bird Treaty Act may nest in an area containing trees or other suitable habitat. As the Federal agency responsible for the protection of migratory birds, the Service recommends vegetation disturbances potentially associated with these activities avoid the general nesting period of March through August or that areas proposed for disturbance be surveyed first for nesting birds, in order to avoid the inadvertent destruction of nests, eggs, etc.

With regard to wetland resources, many in the area occur as resacas (relic river oxbows), creek crossings, coastal/inland potholes, marshes, etc. Executive order 11990 asserts that each Federal agency shall provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

For your information, a complaint declaratory and injunction relief was filed on September 19, 1999, in Defenders of Wildlife, Sierra Club, Frontera Audubon Society, Linda Gardner, Eugene Rouse, and Dr. Reynaldo Ramirez, Jr. v. Doris Meissner, Commissioner, Immigration and Naturalization Service and Lt. General Joe N. Ballard, Chief of Engineers, Army Corps of Engineers. The plaintiffs challenge "Operation Rio Grande" in which the INS is installing lights, roads, boat ramps, fences, and RVS cameras along the Rio Grande River in South Texas. This lawsuit covers Cameron, Hidalgo, Starr and Zapata County. The Service is writing a Biological Opinion (BO) on Operation Rio Grande, but the BO is in progress at this time.

The Lower Rio Grande Valley National Wildlife Refuge (LRGV NWR)that is part of the South Texas Refuge Complex has many tracts of land along the Lower Rio Grande River covering all of the above counties except Webb county. Also, there are seven refuge tracts in Starr County that have been designated as "critical habitat" for the Zapata bladderpod; some of these tracts are located along the river. The LRGV NWR Manager needs to be contacted if any project falls within the refuge tracts. For GIS information on the LRGV NWR tracts, please contact the Refuge Manager (Jeff Rupert) at (956) 784-7551 to obtain more site specific information.

This letter is for general information only and does not constitute a review and clearance over potential effects to federally-listed species resulting from any specific project or activity. Upon completion of the PEA the Service can then consult with your agency on the environmental impacts of the selected area. We appreciate the opportunity to provide pre-project planning information and look forward to providing any further assistance.

If we can be of further assistance, please contact Ernesto Reyes at the above letterhead and telephone number.

Sincerely,

Ernesto Reyes Jr.

Ernesto Reyes
Fish & Wildlife Biologist

For
Allan M. Strand
Acting Field Supervisor

cc:
Field Supervisor, U.S. Fish and Wildlife Service, Corpus Christi, TX
Ken Merritt, South Texas Complex Manager, Alamo, TX
Jose E. Garza, Chief of USBP, McAllen, TX
Bryan Arroyo, USFW Ecological Service ARD, Albuquerque, NM
Steve Helfert, USFW Ecological Service, Albuquerque, NM
Ms. Cindy Schulz, USFW Ecological Service, Albuquerque, NM
Dean Watkins, USFW Federal Activities Division, Albuquerque, NM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
c/o TAMU-CC, Campus Box 338
6300 Ocean Drive
Corpus Christi, Texas 78412

November 19, 2001

Cons.# 2-11-02-I-0020

Charles McGregor
Department of the Army
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. McGregor:

Thank you for your inquiry dated October 18, 2001 about possible environmental impacts from your planned project in Maverick County. The U.S. Corps of Engineers (COE), is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central Region of the INS, U.S. border Patrol (USBP). The PEA will address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items, that, if satisfied, would allow RVS systems to be installed using categorical exclusions contained in the INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide. Due to the volume of requests that we receive and our limited available staff, we are only able to do a preliminary review of the project.

We have enclosed a list of federally listed or proposed threatened and endangered species that may occur in Maverick County. The species information provided should help you to determine if suitable habitat for these listed species exists in any of the proposed project areas or if project activities may affect species on-site, off-site, and/or result in "take" of a federally listed species.

"Take" is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. In addition to the direct take of an individual animal, habitat destruction or modification can be considered take, regardless of whether it has been formally designated as critical habitat, if it would result in the death or injury of wildlife by removing essential habitat components or impairing essential behavior patterns, including breeding, feeding or sheltering.

Projects impacting species that are Federally listed or proposed to be listed under the Endangered Species Act (ESA) may require individual permits from the Service or formal consultation or conferencing with the Service. To assure that you are in compliance with Federal law, you should evaluate the potential for your project to impact threatened and endangered species, species proposed to be listed, and wetlands.

Other Species

In addition we request that your review the potential for your project to affect species that are candidates for addition to the threatened and endangered species lists and other species of concern.

Candidate species - are species that are being considered for possible addition to the threatened and endangered species list. There is sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listings.

Species of Concern - are species that have not yet been fully evaluated. These species could eventually be determined to be in need of listing, particularly if populations are not adequately surveyed for or protected.

Candidate Species and Species of Concern currently have no legal protection. If you find you have potential project impacts to these species the Service would like to provide technical assistance to help avoid or minimize adverse effects. Addressing these species at this stage could better provide for overall ecosystem health in the local area and may avert potential future listing.

Should you need further assistance in determining whether any federally listed species are present, whether your proposed site contains suitable habitat, or whether your actions may affect species on or off-site (directly or indirectly), you may want to enlist the services of a biological consultant to help you make this determination. It is important that any consultant you select have expertise in biological surveys and U.S. Fish and Wildlife survey protocols.

If, after an assessment has been conducted using appropriate biological expertise, the assessment indicates there is potential for the proposed action to affect proposed or listed threatened or endangered species, we recommend that you consult with this office further. If a Federal agency is involved in the project (funding, carrying out, or permitting the project or parts of it) and the project may affect any listed species and impacts cannot be avoided, we recommend consultation be pursued by the Federal agency funding, permitting, or carrying out the project, through Section 7 of the Endangered Species Act (Act). If there is no federal involvement, a Section 10 permit would be required if take of listed species is expected.

Also, the State of Texas protects certain species. Please contact the Texas Parks and Wildlife Department (Endangered Resources Branch), Fountain Park Plaza Building, Suite 100, 3000 South IH-35, Austin, Texas 78704 (telephone 512/912-7011) for information concerning fish, wildlife, and plants of State concern.

If after reviewing the enclosed information, you need additional advice, guidance or information, please contact us again. If you determine your project is likely to impact resources that are of concern to the Service, or which have legal protection and will require Service permits or consultation, please contact Mary Orms at 361/994-9005.

Sincerely,

Allan M. Strand

Allan M. Strand
Field Supervisor

enclosures

Species Federally Listed as Threatened or Endangered, Proposed, Candidate or Other Species of Concern in Maverick County, Texas

November 11, 2001

DISCLAIMER

This County list is based on information available to the U.S. Fish and Wildlife Service at the time of preparation. This list is subject to change, without notice, as new biological information is gathered and should not be used as the sole source for identifying species that may be impacted by a project.

Species Common to many or all Counties: The species listed below may occur as migrants in all or many counties throughout Texas. Species listed specifically in a county have confirmed sightings.

Least tern	(E ~)	*Sterna antillarum*
Whooping crane	(E w/CH)	*Grus americana*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Piping plover	(T)	*Charadrius melodus*
Loggerhead shrike	(SOC)	*Lanius ludovicianus*
White-faced ibis	(SOC)	*Plegadis chihi*

Maverick County

Gulf Coast Jaguarundi	(E)	*Herpailurus yagouaroundi cacomitli*
Ocelot	(E)	*Leopardus pardalis*
Mountain plover	(P/T)	*Charadrius montanus*
Leoncita false foxglove	(SOC)	*Agalinis calycina*
Audubon's oriole	(SOC)	*Icterus graduacauda audubonii*
Ferruginous hawk	(SOC)	*Buteo regalis*
Loggerhead shrike	(SOC)	*Lanius ludovicianus*
Mexican hooded oriole	(SOC)	*Icterus cucullatus cucullatus*
Northern gray hawk	(SOC)	*Buteo nitidus maximus*
Texas olive sparrow	(SOC)	*Arremonops rufivirgatus rufivirgatus*
White-faced ibis	(SOC)	*Plegadis chihi*
Reticulate collared lizard	(SOC)	*Crotaphytus reticulatus*
Rio Grande lesser siren	(SOC)	*Siren intermedia texana*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Texas trumpets	(SOC)	*Acleisanthes crassifolia*

Index

E = Species in danger of extinction throughout all or a significant portion of its range.

T = Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

CH	=	Critical Habitat (in Texas unless annotated ‡)
P/T	=	Species proposed to be listed as threatened.
TSA	=	Threatened due to similarity of appearance.
SOC	=	Species for which there is some information showing evidence of vulnerability, but not enough data to support listing at this time.
~	=	protection restricted to populations found in the "interior" of the United States. In Texas, the least tern receives full protection, except within 50 miles (80 km) of the Gulf Coast.

Species Information

Ocelot *Felis paradalis*

Description/Habitat: The ocelot is a medium-sized (30-41 inches long and 15-30 lbs) feline. Its body coloration is variable; with the upper parts gray or buff with dark brown or black spots, small rings, blotches, and short bars. The underparts are white spotted with black. The tail is ringed or marked with dark bars on the upper surface. The backs of the rounded ears are black with a white central spot. They hunt and move around beginning at dusk. Their area of activity is normally 1-4 square miles. The female ocelot hunts during the night but spends the day at the den site. Kittens are born from late spring through December. The usual litter size is one or two kittens. They accompany the mother on hunts at about 3 months of age and stay with her until they are about a year old. In Texas, the ocelots occur in dense shrubland. Additionally, although the ocelot's prime habitat needs are 70 to 90% canopy coverage, it will utilize a lesser degree of cover for hunting areas, and as protected corridors for travel. Tracts of at least 100 acres of isolated dense brush, or 75 acres of brush interconnected with other habitat tracts by brush corridors are important, however, ocelots will use tracts as small as 5 acres, when adjacent to larger areas of habitat. Roads, narrow water bodies, and rights-of-way, brushy fencelines, water courses and other brush strips connecting areas of habitat are important habitat.

The ocelot population in Texas is very small, probably no more than 80 to 120 individuals (1993 estimate) and approximately 30 to 35 live in the chaparral remaining at or near the Laguna Atascosa National Wildlife Refuge. Although the distribution of these endangered cats is limited for the most part to the southern portion of Texas, a northern population of ocelots may range through portions of Jim Wells, Live Oak, Atascosa, and McMullen, San Patricio and Aransas Counties.

Threats: Population declines are primarily due to habitat loss associated with clearing of brush. Losses of individual ocelots in recent years have been predominately due to collisions with vehicles as the cats attempt to cross roads to gain access to other areas.

Recommendations: Maintenance or creation of brush corridors, but most importantly conservation of the remaining habitat is necessary for the ocelot's survival. Clearing should be limited to only those areas essential to the proposed project and impacted areas be restored with native vegetation. Habitat assessments should be performed. If potential habitat is found to occur, the Service should be contacted.

Jaguarundi *Felis yagouaroundi cacomitli*

Description/Habitat: The jaguarundi is a small, slender-bodied, unspotted at, slightly larger than a domestic cat (8-16 lbs). They have a long tail, short legs, small flattened head and have two color phases, a rusty-brown and a charcoal gray. They hunt primarily in the morning and evening. They are less nocturnal than the ocelot and have been observed during the day. They are good swimmers and enter the water freely. Mating season occurs in November and December. Kittens have been reported in March and also in August. Gestation period is 9 to 10 weeks and litters contain two to four young. In Texas, they occur in dense shrublands. It is believed that the jaguarundi is similar to the ocelot in their requirement for dense brush cover, however, information from Mexico indicate that they may be more tolerant of open areas.

Although the distribution of these endangered cats is limited for the most part to the Rio Grande Valley, there have been unconfirmed sightings of jaguarundi as far north as Aransas, Jim Wells, Kleberg, Live Oak, and San Patricio Counties.

Threats: Habitat loss and alternation, primarily due to brush clearing, and predator control activities.

Recommendations: Maintenance or creation of brush corridors, but most importantly conservation of the remaining habitat is necessary for the jaguarundi's survival. Clearing should be limited to only those areas essential to the proposed project and impacted areas be restored with native vegetation. Habitat assessments should be performed. If potential habitat is found to occur, the Service should be contacted.

Mountain Plover *Charadrius montanus*
Description/Habitat: The mountain plover is one of only nine birds unique to the short-grass prairie environment and according to Breeding Bird Survey data, has the highest rate of decline than any other grassland bird. The mountain plover is a small bird (17.5 cm, 7 in.), about the size of a killdeer. It is light brown above with a lighter colored breast, but lacks the contrasting dark breast belt common to the killdeer and many other plovers. During the breeding season it has a distinct black cap and thin black line between eye and bill. Unlike other plovers rarely found near water. Breeding habitat is typically found in vegetation that is less that 4 inches (10 cm) in height, has at least 30% bare ground, a conspicuous object such as a manure pile, lump of forbs, or rock nearby, and less than 5 percent slope. Nest sites are usually heavily grazed by domestic livestock or prairie dogs. Wintering habitats are very similar to those at breeding sites. known to include short-grass prairie and shrub-steppe landscape, dryland, cultivated farms, and prairie dog towns. Most breeding plovers occur in Colorado, Montana and Wyoming and less abundantly in Texas. In Texas it may occur as a migrant April-May and August-September . It winters irregularly in south central Texas more frequently in and along the lower coastal area. It summers locally in Trans-Pecos and the Panhandle.

Threats: Population decline has been attributed to a combination of factors such as, native grasslands being replaced by agriculture and urban development; early spring plowing and planting on dryland nesting sites; grazing practices that encourage taller grasses and forbs; and loss of prairie dogs and other burrowing rodents. Pesticides may also affect the population.

Recommendations: The Service recommends surveys for plovers in all suitable habitat as well as avoidance of nesting areas to minimize impacts to plovers from planned projects. Surveys may be conducted during early courtship and territorial establishment. This period extends approximately from mid-April through early July. Additional surveys should be conducted prior immediately prior to construction activities to search for active nest sites if breeding birds have been observed during surveys. If an active nest is found a buffer area should be established. For disturbances that include pedestrian foot traffic and continual equipment operations, a 200 meter (220 yards) buffer is recommended, although distance may vary because of topography, type of activity and duration of disturbance. Restoration of disturbed sites should native plant revegetation.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057

January 15, 2002

William Fickel, Jr.
Planning, Environmental, and Regulatory Division
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

Consultation 2-15-02-I-0173

Dear Mr. Fickel:

This responds to your October 18, 2001 letter requesting that the U.S. Fish and Wildlife Service (Service) provide information regarding federally listed or proposed threatened and endangered species and designated Critical Habitat that may be present in the Texas border counties of Kinney, Val Verde, Terrell, Brewster, Presidio, Jeff Davis, Hudspeth, and El Paso.

It is our understanding that the U.S. Army Corps of Engineers, Fort Worth District is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems along the U.S./Mexico and U.S./Canada borders. Your letter provides no details of the proposed actions and is primarily a request for a list of the threatened and endangered species and other sensitive resources, and biological information relating to those resources, that occur in the eight Texas counties along the U.S./Mexico border that fall within our area of responsibility. We are providing this information to assist you, the INS, and the U.S. Border Patrol in assessing and avoiding impacts to Federally listed or proposed threatened and endangered species and their habitat.

Threatened and Endangered Species

The list of the Federally listed and proposed threatened and endangered species and species of concern that occur in Kinney, Val Verde, Terrell, Brewster, Presidio, Jeff Davis, Hudspeth, and El Paso counties is attached to this letter for your reference. We have also included descriptions of the species and their habitat for those species for which this information in a succinct format. Unfortunately we are unable to provide you with information on these species distributions and locations in a GIS format at this time. We are slowly creating a GIS with this information for species within our area of responsibility as time and resources allow, but the GIS will not be available for dissemination in the near future. Also note that we have not prepared Biological Opinions for most of the species that occur along the U.S./Mexico border, so we do not have copies of these documents to share with you in most cases.

Migratory Birds

Migratory birds, including a vast majority of the bird species that occur in the proposed project area, are protected under the Migratory Bird Treaty Act (MBTA). The MBTA implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds without a permit is unlawful.

Many species of migratory birds occur in the U.S./Mexico border region, and utilize the diversity of riparian, brush, scrub, desert, and aquatic habitat types that occur in this area. Many other migratory bird species migrate through the U.S./Mexico border region during the spring and fall migration periods. Any activity that would kill or injure migratory birds would violate the MBTA. For example, if the RVS systems will require tall towers to support any video cameras or other equipment, and those towers are improperly designed, the towers could result in the death or injury of many migratory birds.

The State of Texas provides legal protection for additional species of plants and animals (Texas Parks and Wildlife Code Chapters 67, 68, and 88). We recommend you contact the Diversity Program of the Texas Parks and Wildlife Department (TPWD), 3000 IH-35 South, Suite 100, Austin, Texas 78704 (512/912-7011) for information concerning animals and plants of State concern.

We thank you for your concern for threatened and endangered species and other natural resources, and we appreciate the opportunity to provide you with information for your Programmatic Environmental Assessment. If we can be of further assistance or if you have questions about these comments, please contact Ray Brown at the Service's Austin Office at (512) 490-0057, extension 243. Please refer to the Consultation number listed above in any future correspondence with the Service regarding this project.

Sincerely,

E. Dawn Whitehead

for David C. Frederick
Supervisor

Enclosures

Federally Listed as Threatened and Endangered Species of Texas
January 10, 2002

This list represents species that may be found in counties throughout the Austin Ecological Services office's area of responsibility. Please contact the Austin ES office (U.S. Fish and Wildlife Service, 10711 Burnet Rd., Suite 200, Austin, Texas 78758, 512/490-0057) if additional information is needed. Please contact the appropriate USFWS field office in Arlington, Clear Lake, or Corpus Christi for projects occurring in counties not listed below.

DISCLAIMER

This County by County list is based on information available to the U.S. Fish and Wildlife Service at the time of preparation, date on page 1. This list is subject to change, without notice, as new biological information is gathered and should not be used as the sole source for identifying species that may be impacted by a project.

Edwards Aquifer species: (Edwards Aquifer County) refers to those six counties within the Edwards Aquifer region. The Edwards Aquifer underlies portions of Kinney, Uvalde, Medina, Bexar, Hays, and Comal Counties (Texas). The Service has expressed concern that the combined current level of water withdrawal for all consumers from the Edwards Aquifer adversely affects aquifer-dependent species located at Comal and San Marcos springs during low flows. Deterioration of water quality and/or water withdrawal from the Edwards Aquifer may adversely affect eight federally-listed species.

Comal Springs riffle beetle	(E)	*Heterelmis comalensis*
Comal Springs dryopid beetle	(E)	*Stygoparnus comalensis*
Fountain darter	(E w/CH)	*Etheostoma fonticola*
Peck's cave amphipod	(E)	*Stygobromus (=Stygonectes) pecki*
San Marcos gambusia	(E w/CH)	*Gambusia georgei*
Texas wild-rice	(E w/CH)	*Zizania texana*
Texas blind salamander	(E)	*Typhlomolge rathbuni*
San Marcos salamander	(T □w/CH)	*Eurycea nana*

* The Barton Springs salamander is found in Travis County but may be affected by activities within the Barton Springs Segment of the Edwards Aquifer, which includes portions of Northern Hays County.

Migratory Species Common to many or all Counties: Species listed specifically in a county have confirmed sightings. If a species is not listed they may occur as migrants in those counties.

Least tern	(E ~)	*Sterna antillarum*
Whooping crane	(E w/CH)	*Grus americana*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Piping plover	(T w/P/CH)	*Charadrius melodus*
Loggerhead shrike	(SOC)	*Lanius ludovicianus*
White-faced ibis	(SOC)	*Plegadis chihi*

Brewster County

Black-capped vireo	(E)	*Vireo atricapillus*
Golden-cheeked warbler	(E)	*Dendroica chrysoparia*
Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Southwestern willow flycatcher	(E‡)	*Empidonax traillii extimus*
Whooping crane	(E w/CH)	*Grus americana*
Mexican long-nosed bat	(E)	*Leptonycteris nivalis*

Big Bend gambusia	(E)	*Gambusia gaigei*
Davis' green pitaya	(E)	*Echinocereus viridiflorus* var. *davisii (=E. davisii)*
Nellie cory cactus	(E)	*Coryphantha (=Escobaria =Mammillaria) minima*
Terlingua Creek cats-eye	(E)	*Cryptantha crassipes*
Bunched cory cactus	(T)	*Coryphantha ramillosa*
Chisos Mountain hedgehog cactus	(T)	*Echinocereus chisoensis* (=*reichenbachii*) var. *chisoensis*
Hinckley oak	(T)	*Quercus hinckleyi*
Lloyd's Mariposa cactus	(T)	*Sclerocactus (=Echinomastus=Echinocactus) mariposensis*
Mountain plover	(P/T)	*Charadrius montanus*
Texas hornshell (clam)	(C)	*Popenaias popei*
Tall paintbrush	(C)	*Castilleja elongata*
Guadalupe fescue	(C)	*Festuca ligulata*
Leoncita false foxglove	(SOC)	*Agalinis calycina*
Texas false saltgrass	(SOC)	*Allolepsis texana*
Ferruginous hawk	(SOC)	*Buteo regalis*
Baird's sparrow	(SOC)	*Ammodramus bairdii*
Loggerhead shrike	(SOC)	*Lanius ludovicianus*
Northern goshawk	(SOC)	*Accipiter gentilis*
Northern gray hawk	(SOC)	*Buteo nitidus maximus*
Texas olive sparrow	(SOC)	*Arremonops rufivirgatus rufivirgatus*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
White-faced ibis	(SOC)	*Plegadis chihi*
Davis Mountain cottontail rabbit	(SOC)	*Sylvilagus floridanus robustus*
Greater western mastiff bat	(SOC)	*Eumops perotis californicus*
Presidio mole	(SOC)	*Scalopus aquaticus texanus*
Spotted bat	(SOC)	*Euderma maculatum*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Blotched gambusia	(SOC)	*Gambusia senilis*
Blue sucker	(SOC)	*Cycleptus elongatus*
Chihuahua shiner	(SOC)	*Notropis chihuahua*
Conchos pupfish	(SOC)	*Cyprinodon eximius*
Mexican stoneroller	(SOC)	*Campostoma ornatum*
Proserpine shiner	(SOC)	*Cyprinella proserpina*
Rio Grande darter	(SOC)	*Etheostoma grahami*
Rio Grande shiner	(SOC)	*Notropis jemezanus*
Blanchards' sphinx moth	(SOC)	*Adhemarius blanchardorum*
Bonita diving beetle	(SOC)	*Deronectes neomexicana*
Subtropical blue-black tiger beetle	(SOC)	*Cicindela nigrocoerula subtropica*
Big Bend (Desert Mts.) bluegrass	(SOC)	*Poa strictiramea*
Big Bend hop hornbeam	(SOC)	*Ostrya chisosensis*
Bigpod bonamia	(SOC)	*Bonamia ovalifolia*
Bush-pea	(SOC)	*Genistidium dumosum*
White column cory cactus	(SOC)	*Coryphantha albicolumnaria*
Bushy wild-buckwheat	(SOC)	*Eriogonum suffruticosum*
Chaffey's cory cactus	(SOC)	*Coryphantha chaffeyi*
Chisos agave	(SOC)	*Agave glomeruliflora*
Chisos coral-root	(SOC)	*Hexalectris revoluta*
Chisos pinweed	(SOC)	*Lechea mensalis*
Cliff bedstraw	(SOC)	*Galium correllii*
Cox's dalea	(SOC)	*Dalea bartonii*
Cutler's twistflower	(SOC)	*Streptanthus cutleri*

Dense cory cactus	(SOC)	*Coryphantha dasyacantha* var. *dasyacantha*
Desert night-blooming cereus	(SOC)	*Cereus greggii* var. *greggii*
Duncan's cory cactus	(SOC)	*Coryphantha duncanii*
Glass Mountain coral-root	(SOC)	*Hexalectris nitida*
Glass Mountain rock-daisy	(SOC)	*Perityle vitreomontana*
Golden-spine hedgehog cactus	(SOC)	*Echinocereus chloranthus* var. *neocapillus*
Golden-spined prickly-pear	(SOC)	*Opuntia aureispina*
Heather leaf-flower	(SOC)	*Phyllanthus ericoides*
Hester's cory cactus	(SOC)	*Coryphantha hesteri*
Hinckley's brickelbush	(SOC)	*Brickellia brachyphylla* var. *hinckleyi*
Lateleaf oak	(SOC)	*Quercus tardifolia*
Little-leaf brongniartia	(SOC)	*Brongniartia minutifolia*
Long spur columbine	(SOC)	*Aquilegia longissima*
Many-flowered unicorn plant	(SOC)	*Proboscidea spicata*
Maravillas milkwort	(SOC)	*Polygala maravillasensis*
Mary's bluet	(SOC)	*Hedyotis butterwickiae*
Old blue mock pennyroyal	(SOC)	*Hedeoma pilosum*
Pale phacelia	(SOC)	*Phacelia pallida*
Perennial caltrop	(SOC)	*Kallstroemia perennans*
Purple gay-mallow	(SOC)	*Batesimalva violacea*
Ripley's senna	(SOC)	*Senna ripleyana*
Robert's stonecrop	(SOC)	*Sedum robertsianum*
Silver cholla	(SOC)	*Opuntia imbricata* var. *argentea*
Slender oak	(SOC)	*Quercus graciliformis*
Sonora fleabane	(SOC)	*Erigeron mimegletes*
Stairstep two-bristle rock-daisy	(SOC)	*Perityle bisetosa* var. *scalaris*
Straw-spine glory of Texas	(SOC)	*Thelocactus bicolor* var. *flavidispinus*
Swallow spurge	(SOC)	*Chamaesyce golondrina*
Terlingua brickelbush	(SOC)	*Brickellia brachyphylla* var. *terlinguensis*
Texas milkvine	(SOC)	*Matelea texensis*
Texas wolfberry	(SOC)	*Lycium texanum*
Three-tongued spurge	(SOC)	*Chamaesyce chaetocalyx* var. *triligulata*
Trans-Pecos maidenbush	(SOC)	*Andrachne arida*
Two-bristle rock-daisy	(SOC)	*Perityle bisetosa* var. *bisetosa*
Texas purple spike	(SOC)	*Hexalectris warnockii*
Wilkinson's whitlow-wort	(SOC)	*Paronychia wilkinsonii*
Wright's water-willow	(SOC)	*Justicia wrightii*
Shinner's tickle-tongue	(SOC)	*Zanthoxylum parvum*

El Paso County

Least tern	(E ~)	*Sterna antillarum*
Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Southwestern willow flycatcher	(E‡)	*Empidonax traillii extimus*
Sneed pincushion cactus	(E)	*Coryphantha sneedii (=Escobaria=Mammillaria) var. sneedii*
Mexican spotted owl	(T‡)	*Strix occidentalis lucida*
Texas false saltgrass	(SOC)	*Allolepsis texana*
Ferruginous hawk	(SOC)	*Buteo regalis*
Northern gray hawk	(SOC)	*Buteo nitidus maximus*
Northern goshawk	(SOC)	*Accipiter gentilis*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
White-faced ibis	(SOC)	*Plegadis chihi*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*

Franklin Mountain talussnail	(SOC)	*Sonorella metcalfi*
Alamo beardtongue	(SOC)	*Penstemon alamosensis*
Comal snakewood	(SOC)	*Colubrina stricta*
Dense cory cactus	(SOC)	*Coryphantha dasyacantha dasyacantha*
Desert night-blooming cereus	(SOC)	*Cereus greggii* var. *greggii*
Hueco rock-daisy	(SOC)	*Perityle huecoensis*
Sand prickly-pear	(SOC)	*Opuntia arenaria*
Sand sacahuista	(SOC)	*Nolina arenicola*
Sandhill goosefoot	(SOC)	*Chenopodium cycloides*
Franklin Mountain wood snail	(SOC)	*Ashmunella pasonis*

Hudspeth County

Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Southwestern willow flycatcher	(E‡)	*Empidonax traillii extimus*
Mexican spotted owl	(T‡))	*Strix occidentalis lucida*
Watson's false clappia-bush	(SOC)	*Pseudoclappia watsonii*
Ferruginous hawk	(SOC)	*Buteo regalis*
Northern goshawk	(SOC)	*Accipiter gentilis*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
White-faced ibis	(SOC)	*Plegadis chihi*
Desert pocket gopher	(SOC)	*Geomys bursarius arenarius*
Occult little brown bat	(SOC)	*Myotis lucifugus occultus*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Barbara Ann tiger beetle	(SOC)	*Cicindela politula barbarannae*
Chisos agave	(SOC)	*Agave glomeruliflora*
Dense cory cactus	(SOC)	*Coryphantha dasyacantha dasyacantha*
Desert night-blooming cereus	(SOC)	*Cereus greggii* var. *greggii*
Gypsum scalebroom	(SOC)	*Lepidospartum burgessii*
Mat leastdaisy	(SOC)	*Chaetopappa hersheyi*
Paper-spined cactus	(SOC)	*Sclerocactus papyracanthus*
Sand prickly-pear	(SOC)	*Opuntia arenaria*
Sand sacahuista	(SOC)	*Nolina arenicola*
Smooth-stem skullcap	(SOC)	*Scutellaria laevis*
Swallow spurge	(SOC)	*Chamaesyce golondrina*
Terlingua brickelbush	(SOC)	*Brickellia brachyphylla* var. *terlinguensis*
Texas wolfberry	(SOC)	*Lycium texanum*

Jeff Davis County

Black-capped vireo	(E)	*Vireo atricapillus*
Least tern	(E~)	*Sterna antillarum*
Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Southwestern willow flycatcher	(E‡)	*Empidonax traillii extimus*
Comanche Springs pupfish	(E)	*Cyprinodon elegans*
Pecos gambusia	(E)	*Gambusia nobilis*
Little Aguja pondweed	(E)	*Potamogeton clystocarpus*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Mexican spotted owl	(T‡)	*Strix occidentalis lucida*
Mountain plover	(P/T)	*Charadrius montanus*
Phantom Lake cave snail	(C)	*Cochliopa texana*
Phantom tryonia (=Cheatum's snail)	(C)	*Tryonia cheatumi*
Shinner's tickle-tongue	(SOC)	*Zanthoxylum parvum*
Ojinaga ringstem	(SOC)	*Anulocaulis reflexus*
Watson's false clappia-bush	(SOC)	*Pseudoclappia watsonii*

Texas false saltgrass	(SOC)	*Allolepsis texana*
Ferruginous hawk	(SOC)	*Buteo regalis*
Northern gray hawk	(SOC)	*Buteo nitidus maximus*
Northern goshawk	(SOC)	*Accipiter gentilis*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
White-faced ibis	(SOC)	*Plegadis chihi*
Limpia Creek pocket gopher	(SOC)	*Thomomys umbrinus texensis*
Davis Mountain cottontail rabbit	(SOC)	*Sylvilagus floridanus robustus*
Limpia southern pocket gopher	(SOC)	*Thomomys umbrinus limpiae*
Presidio mole	(SOC)	*Scalopus aquaticus texanus*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Texas minute moss beetle	(SOC)	*Limnebius texanus*
Diminutive amphipod	(SOC)	*Gammarus hyalleloides*
Brune's tryonia	(SOC)	*Tryonia brunei*
Davis County springsnail	(SOC)	*Fontelicella davisi*
Dense cory cactus	(SOC)	*Coryphantha dasyacantha dasyacantha*
Desert night-blooming cereus	(SOC)	*Cereus greggii* var. *greggii*
Fringed paintbrush	(SOC)	*Castilleja ciliata*
Hinckley's jacob-ladder	(SOC)	*Polemonium pauciflorum* ssp. *hinckleyi*
Hinckley's brickelbush	(SOC)	*Brickellia brachyphylla* var. *hinckleyi*
Livermore sandwort	(SOC)	*Arenaria livermorensis*
Livermore sweet-cicely	(SOC)	*Osmorhiza mexicana* ssp. *bipatriata*
Long spur columbine	(SOC)	*Aquilegia longissima*
Many-flowered unicorn plant	(SOC)	*Proboscidea spicata*
Sandhill goosefoot	(SOC)	*Chenopodium cycloides*
Standley whitlow-grass	(SOC)	*Draba standleyi*
Texas purple spike	(SOC)	*Hexalectris warnockii*
Withered wooly milk-vetch	(SOC)	*Astragalus mollissimus marcidus*
Young's snowbell	(SOC)	*Styrax youngae*

Kinney County (Edwards Aquifer County)

Black-capped vireo	(E)	*Vireo atricapillus*
Golden-cheeked warbler	(E)	*Dendroica chrysoparia*
Texas snowbells	(E)	*Styrax texana*
Tobusch fishhook cactus	(E)	*Ancistrocactus (=Echinocactus=Mammilliaria)*
tobuschii		
Devils River minnow	(T)	*Dionda diaboli*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Texas salamander	(SOC)	*Eurycea neotenes*
Broad-pod rushpea	(SOC)	*Caesalpinia brachycarpa*
Texas trumpets	(SOC)	*Acleisanthes crassifolia*
Maculated manfreda skipper	(SOC)	*Stalligsia maculosus*

Presidio County

Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Mexican long-nosed bat	(E)	*Leptonycteris nivalis*
Southwestern willow flycatcher	(E‡)	*Empidonax traillii extimus*
Hinckley oak	(T)	*Quercus hinckleyi*
Lloyd's Mariposa cactus	(T)	*Sclerocactus (=Echinomastus=Echinocactus)*
		mariposensis
Ojinaga ringstem	(SOC)	*Anulocaulis reflexus*
Texas false saltgrass	(SOC)	*Allolepsis texana*

Ferruginous hawk	(SOC)	*Buteo regalis*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
Gray-checkered whiptail	(SOC)	*Cniemidophorus dixoni*
Big Bend mud turtle	(SOC)	*Kinosternon hirtipes murrayi*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Davis Mountain cottontail rabbit	(SOC)	*Sylvilagus floridanus robustus*
Greater western mastiff bat	(SOC)	*Eumops perotis californicus*
Presidio mole	(SOC)	*Scalopus aquaticus texanus*
Blue sucker	(SOC)	*Cycleptus elongatus*
Chihuahua shiner	(SOC)	*Notropis chihuahua*
Conchos pupfish	(SOC)	*Cyprinodon eximius*
Mexican stoneroller	(SOC)	*Campostoma ornatum*
Proserpine shiner	(SOC)	*Cyprinella proserpina*
Rio Grande shiner	(SOC)	*Notropis jemezanus*
Bushy wild-buckwheat	(SOC)	*Eriogonum suffruticosum*
White column cory cactus	(SOC)	*Coryphantha albicolumnaria*
Contra yerba	(SOC)	*Pediomelum pentaphyllum*
Cylinder spikerush	(SOC)	*Eleocharis cylindrica*
Desert night-blooming cereus	(SOC)	*Cereus greggii* var. *greggii*
Duncan's cory cactus	(SOC)	*Coryphantha duncanii*
Fresno Creek thelypody	(SOC)	*Thelypodium tenue*
Golden-spine hedgehog cactus	(SOC)	*Echinocereus chloranthus* var. *neocapillus*
Hinckley's columbine	(SOC)	*Aquilegia chrysantha hinckleyana*
Long spur columbine	(SOC)	*Aquilegia longissima*
Many-flowered unicorn plant	(SOC)	*Proboscidea spicata*
Manystem spiderflower	(SOC)	*Cleome multicaulis*
Perennial caltrop	(SOC)	*Kallstroemia perennans*
Sierra Vieja brickelbush	(SOC)	*Brickellia viejensis*
Swallow spurge	(SOC)	*Chamaesyce golondrina*
Trans-Pecos maidenbush	(SOC)	*Andrachne arida*
Withered wooly milk-vetch	(SOC)	*Astragalus mollissimus marcidus*
Presidio County springsnail	(SOC)	*Fontelicella metcalfi*

Terrell County

Black-capped vireo	(E)	*Vireo atricapillus*
Bunched cory cactus	(T)	*Coryphantha ramillosa*
Texas hornshell (clam)	(C)	*Popenaias popei*
Mexican hooded oriole	(SOC)	*Icterus cucullatus cucullatus*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
Davis Mountain cottontail rabbit	(SOC)	*Sylvilagus floridanus robustus*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Blotched gambusia	(SOC)	*Gambusia senilis*
Blue sucker	(SOC)	*Cycleptus elongatus*
Chihuahua shiner	(SOC)	*Notropis chihuahua*
Conchos pupfish	(SOC)	*Cyprinodon eximius*
Mexican stoneroller	(SOC)	*Campostoma ornatum*
Proserpine shiner	(SOC)	*Cyprinella proserpina*
Rio Grande darter	(SOC)	*Etheostoma grahami*
Rio Grande shiner	(SOC)	*Notropis jemezanus*
Leonora's dancer (damselfly)	(SOC)	*Argia leonorae*
Phantom Lake cave snail	(SOC)	*Cochliopa texana*
Desert night-blooming cereus	(SOC)	*Cereus greggii* var. *greggii*
Heather leaf-flower	(SOC)	*Phyllanthus ericoides*

Hester's cory cactus	(SOC)	*Coryphantha hesteri*
Maravillas milkwort	(SOC)	*Polygala maravillasensis*
Texas purple spike	(SOC)	*Hexalectris warnockii*

Val Verde County

Black-capped vireo	(E)	*Vireo atricapillus*
Brown pelican	(E)	*Pelecanus occidentalis*
Least tern	(E ~)	*Sterna antillarum*
Texas snowbells	(E)	*Styrax texana*
Tobusch fishhook cactus	(E)	*Ancistrocactus (=Echinocactus=Mammilliaria) tobuschii*
Devils River minnow	(T)	*Dionda diaboli*
Bald eagle	(T)	*Haliaeetus leucocephalus*
Mountain plover	(P/T)	*Charadrius montanus*
Texas hornshell (clam)	(C)	*Popenaias popei*
Cave myotis (bat)	(SOC)	*Myotis velifer*
Greater western mastiff-bat	(SOC)	*Eumops perotis californicus*
Pale Townsend's big-eared bat	(SOC)	*Plecotus townsendii pallescens*
Yuma myotis (bat)	(SOC)	*Myotis yumanensis*
Audubon's oriole	(SOC)	*Icterus cucullatus audubonii*
Black tern	(SOC)	*Chlidonias niger*
Ferruginous hawk	(SOC)	*Buteo regalis*
Mexican hooded oriole	(SOC)	*Icterus cucullatus cucullatus*
Texas olive sparrow	(SOC)	*Arremonops rufivirgatus rufivirgatus*
Western burrowing owl	(SOC)	*Athene cunicularia hypugea*
White-faced ibis	(SOC)	*Plegadis chihi*
Reticulate collared lizard	(SOC)	*Crotaphytus reticulatus*
Texas horned lizard	(SOC)	*Phrynosoma cornutum*
Texas salamander	(SOC)	*Eurycea neotenes*
Blotched gambusia	(SOC)	*Gambusia senilis*
Blue sucker	(SOC)	*Cycleptus elongatus*
Chihuahua shiner	(SOC)	*Notropis chihuahua*
Conchos pupfish	(SOC)	*Cyprinodon eximius*
Proserpine shiner	(SOC)	*Cyprinella proserpina*
Rio Grande darter	(SOC)	*Etheostoma grahami*
Rio Grande shiner	(SOC)	*Notropis jemezanus*
Leonora's Dancer	(SOC)	*Argia leonorae*
Mexican fawnsfoot (mussel)	(SOC)	*Truncilla cognata*
Salina mucket (mussel)	(SOC)	*Disconaias salinasensis*
Texas hornshell (mussel)	(SOC)	*Popenaias popei*
Cliff bedstraw	(SOC)	*Galium correllii*
Correll's false dragon-head	(SOC)	*Physostegia correllii*
Perennial caltrop	(SOC)	*Kallstroemia perennans*
Rydberg's scurfpea	(SOC)	*Pediomelum humile*
Sabinal prairie-clover	(SOC)	*Dalea sabinalis*
Sonora fleabane	(SOC)	*Erigeron mimegletes*
Texas greasebush	(SOC)	*Forsellesia texensis*
Texas trumpets	(SOC)	*Acleisanthes crassifolia*
Warnock's rock-daisy	(SOC)	*Perityle warnockii*
Wright's water-willow	(SOC)	*Justicia wrightii*

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Statewide or areawide migrants are not included by county, except where they breed or occur in concentrations. The whooping crane is an exception; an attempt is made to include all confirmed sightings on this list.

E	=	Species in danger of extinction throughout all or a significant portion of its range.
T	=	Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
C	=	Species for which the Service has on file enough substantial information to warrant listing as threatened or endangered.
CH	=	Critical Habitat (in Texas unless annotated ‡)
P/	=	Proposed ...
P/E	=	Species proposed to be listed as endangered.
P/T	=	Species proposed to be listed as threatened.
TSA	=	Threatened due to similarity of appearance.
SOC	=	Species for which there is some information showing evidence of vulnerability, but not enough data to support listing at this time. These species are afforded no formal protection under the Endangered Species Act of 1973, as amended, but may be protected under other state or federal laws.
□	=	with special rule
‡	=	CH designated (or proposed) outside Texas
~	=	protection restricted to populations found in the "interior" of the United States. In Texas, the least tern receives full protection, except within 50 miles (80 km) of the Gulf Coast.

STATUS: Endangered (60 FR 10694; February 27, 1995) designation of critical habitat is deferred while the Fish and Wildlife Service (Service) gathers further comments and reconsiders the prudence of designation and the appropriate boundaries of any area to be designated, no critical habitat area was proposed for Texas in the proposed rule.

DESCRIPTION: The southwestern willow flycatcher is a small neotropical migratory bird, about 5.75 inches long. It has a grayish-green back and wings, white throat, light gray-olive breast, and pale yellowish belly. Two wingbars are visible; the eye ring is faint or absent.

HABITAT: This species is restricted to dense riparian associations of willow, cottonwood, buttonbush, tamarisk, *Baccharis*, and other deciduous shrubs and trees. This habitat occurs in riparian habitats along rivers, streams, or other wetlands that are often small and/or linear, and widely separated by expanses of arid lands.

DISTRIBUTION:

Present: The breeding range of this species includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico. The wintering grounds of the willow flycatcher are not well known; they most likely winter in Mexico, Central America, and perhaps northern South America.

Historic: Same as present, but in smaller, more scattered areas.

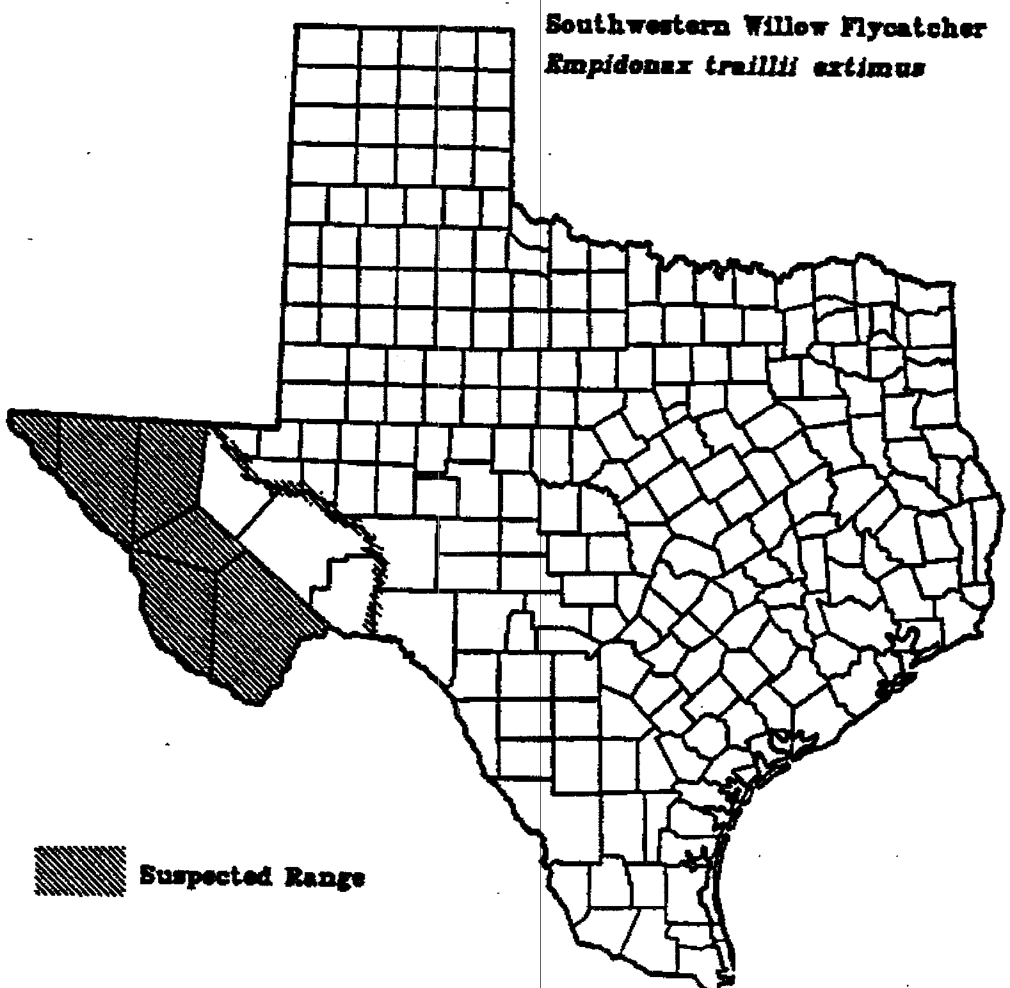
THREATS AND REASONS FOR DECLINE: The southwestern willow flycatcher is endangered by extensive loss of habitat, brood parasitism and lack of adequate protective regulations. Large scale losses of southwestern wetlands have occurred, particularly cottonwood-willow riparian habitats. Water development, tamarisk invasion, various livestock impacts, and cowbird brood parasitism are also threats to the flycatcher's survival.

OTHER INFORMATION: Texas is the eastern limit of the southwestern willow flycatcher's breeding range. They have been recorded from the Fort Hancock area, the Guadalupe Mountains, the Davis Mountains, and Brewster County including Big Bend National Park. Data are lacking on the current distribution of southwestern willow flycatchers in Texas. However, habitat may occur particularly in the Rio Grande and Pecos river drainages.

REFERENCES:

Oberholser, H.C. 1974. The Bird Life of Texas. University of Texas Press, Austin, Texas.
Wauer, R.H. 1985. A Field Guide to the Birds of the Big Bend. Texas Monthly Press, Austin, Texas. 283pp.

REV. DATE 6/95

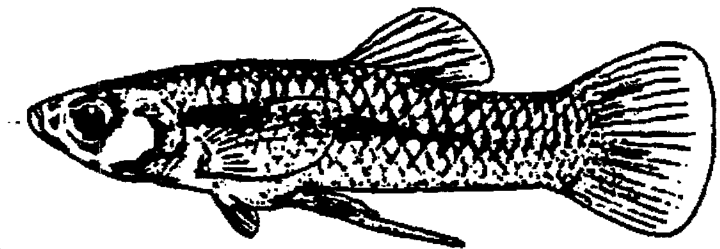


Map only shows Texas range

STATUS: Endangered (35 FR 16047-October 13, 1970) without critical habitat.

DESCRIPTION: A small (1.2 in long), livebearing fish with a dark lateral stripe. Metallic colored, best recognized from other *Gambusia* by the lack of extensive yellowish coloration. Lacks the row of black spots found on caudal fin of largespring gambusia. Females have a black area on the abdomen that surrounds the anal fin and anus.

HABITAT: Restricted to stenothermal, clear waters in small, shallow springs with abundant vegetation.



DISTRIBUTION:

Present: Jeff Davis County: Phantom Lake Springs; Reeves County: San Solomon, Giffin, and East Sandia Springs, and irrigation canals in the Balmorhea area; Pecos County: Diamond-Y Springs and confluence of Leon Creek and Diamond-Y Draw. It also occurs in several localities in southeastern New Mexico.

Historic: Pecos River drainage in southwestern Texas and southeastern New Mexico.

THREATS AND/OR REASONS FOR DECLINE: Habitat loss (due to groundwater pumping/loss of springflow, damming, and irrigation), contaminants (from oil/gas well field development, oil/gas pipelines, and pesticides), and competition and hybridization with introduced non-native/exotic species (mostly largespring gambusia (*G. geiseri*) and western mosquitofish (*G. affinis*)).

OTHER INFORMATION: Recovery plan completed in 1983; currently undergoing revision. Diet consists mostly of filamentous algae, insects and amphipods. Estimated population in 1980 in the Balmorhea area was 100,000. More than one million occurred in Leon Creek, and 100,000 occurred in the Diamond-Y Springs outflow.

REFERENCES:

Echelle, A.A., and A.F. Echelle. 1980. Status of the Pecos gambusia, *Gambusia nobilis*. U.S. Fish and Wildlife Service U.S. Fish and Wildlife Service, Albuquerque, NM. Endangered Species Report No. 10. p. 73.

Echelle, A.F., A.A. Echelle, and D.R. Edds. 1989. Conservation genetics of a spring-dwelling desert fish, the Pecos gambusia (*Gambusia nobilis*, Poeciliidae). Conservation Biology 3(2):159-169.

Hatch, M.D., and M.C. Conway. 1980. Management plan for the Pecos gambusia, *Gambusia nobilis* on the Bitter Lake National Wildlife Refuge. U.S. Fish and Wildlife Service, Albuquerque, NM.

Meffe, G.K., and F.F. Snelson, Jr. (eds.). 1989. Ecology and evolution of livebearing fishes (Poeciliidae). Prentice Hall. Englewood Cliffs, New Jersey. p. xxv + 453.

Rosen, D.E. and R.M. Bailey. 1963. The poeciliid fishes (Cyprinodontiformes), their structure, zoogeography, and systematics. *Bull. Amer. Mus. Nat. Hist.* 126:1-176.

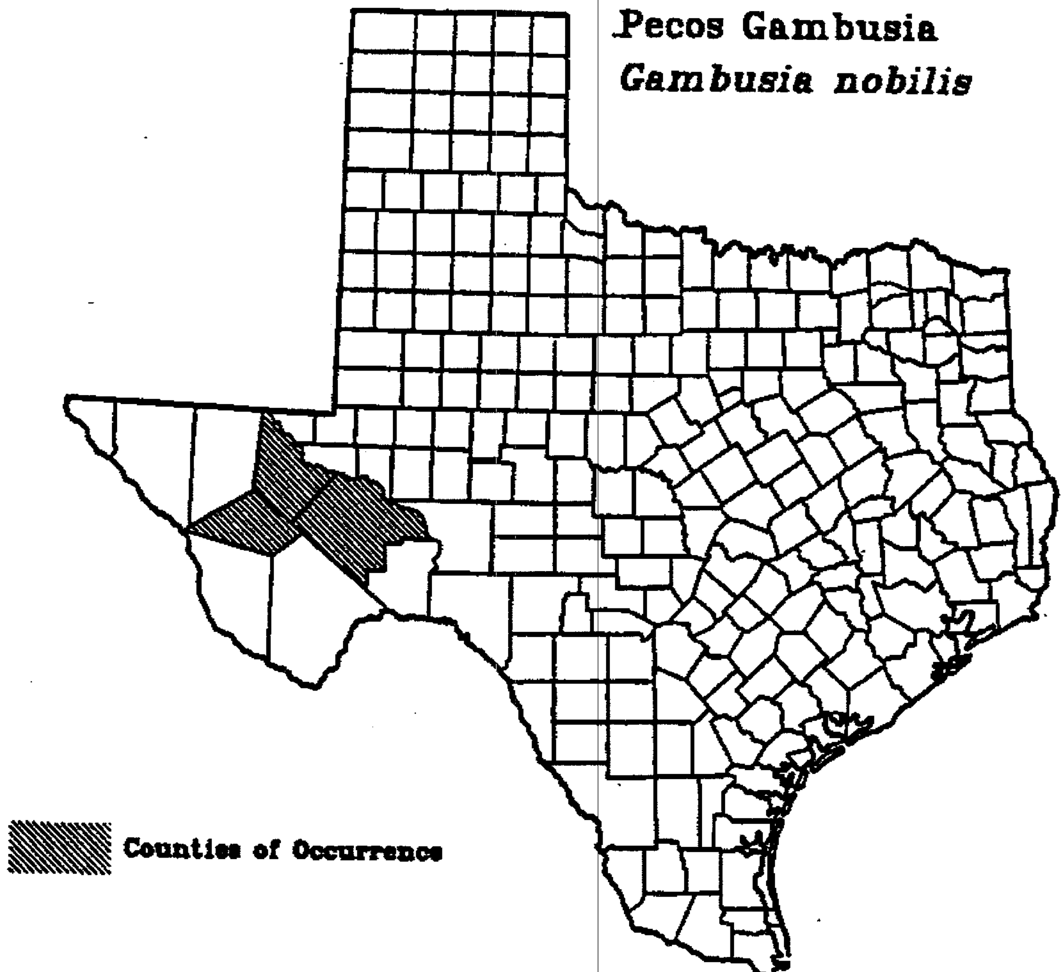
Small, T.A. and G.B. Ozuna. 1993. Ground-water conditions in Pecos County, Texas, 1987. U.S. Geological Survey Water Resources Inventory Report 92-4190.

U.S. Fish and Wildlife Service. 1983. Pecos Gambusia Recovery Plan. Albuquerque, NM. p. 41.

REV. DATE 6/95

Pecos Gambusia

Gambusia nobilis

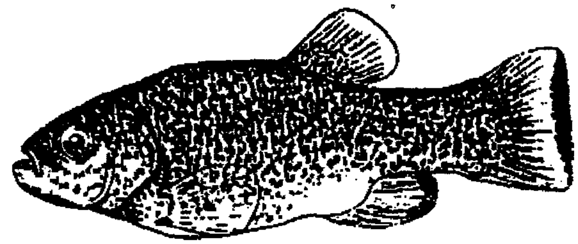


Map only shows Texas range

STATUS: Endangered (32 FR 4001-March 11, 1967) without critical habitat.

DESCRIPTION: A small (1.3-1.8 in), colorful pupfish. The most striking feature distinguishing *C. elegans* from all other *Cyprinodon* species is the unusual "speckled" color pattern of the male. Other distinguishing characteristics are a more streamlined body than is usual for the genus, and the lack of vertical bars.

HABITAT: Adapted to running water. Found in springs, streams, and irrigation canals/ditches. In irrigation canals, most abundant in shallow areas with low water velocities. Often abundant in earthen ditches and concrete flumes 4 in. or more deep with bottoms covered with debris and *Chara* (muskgrass), less common in concrete flumes where water depth is less than 4 in. and/or bottom scoured of debris.



DISTRIBUTION:

Present: Reeves County - Balmorhea State Park (San Solomon Springs), Giffin Springs, and irrigation canals in the Toyahvale-Balmorhea area; Jeff Davis County - Phantom Lake Springs and connecting irrigation canals.

Historic: Springs and tributaries to the Pecos River in Texas, particularly Comanche Springs (where it was first described), Pecos County, Texas. Extirpated from Comanche Springs when it ceased flowing in 1955 due to excessive demand for ground water.

THREATS AND/OR REASONS FOR DECLINE: Habitat loss (due to ground water pumping, loss of springflow, irrigation, and channelization), and hybridization and competition with introduced non-native *Cyprinodon* and competition with introduced fish species.

OTHER INFORMATION: Recovery plan completed in 1981, currently under revision. Captive population is maintained at Uvalde National Fish Hatchery in Texas. A small refugium canal within the Balmorhea State Park supports several thousand Comanche Springs pupfish. Another refugium canal has been built at Phantom Lake. A cienega (desert marsh) is under construction at Balmorhea State Park. Spawning occurs year-round in stenothermal spring outflows and in small, eurythermal pools of standing water.

REFERENCES:

Davis, J.R. 1979. Die-offs of an endangered pupfish, *Cyprinodon elegans* (Cyprinodontidae). Southwest. Nat. 24:534-536.

Echelle, A.A. 1975. A multivariate analysis of variation in an endangered fish, *Cyprinodon elegans*, with an assessment of populational status. *Texas J. Sci.* 30: 229-231.

Echelle, A.A., A.F. Echelle, and D.R. Edds. 1987. Population structure of four pupfish species (Cyprinodontidae: *Cyprinodon*) from the Chihuahuan desert region of New Mexico and Texas: allozymic variation. *Copeia* 1987(3):668-681.

Echelle, A.F., and A.A. Echelle. 1994. Assessment of genetic introgression between two pupfish species, *Cyprinodon elegans* and *C. variegatus* (Cyprinodontidae), after more than 20 years of secondary contact. *Copeia* 1994(3):590-597.

Hart, M.A. 1992. The hydrogeology of the Davis Mountains, Trans-Pecos Texas. Unpublished M.A. thesis. University of Texas at Austin. p. 157.

Small, T.A. and G.B. Ozuna. 1993. Ground-water conditions in Pecos County, Texas, 1987. U.S. Geological Survey Water Resources Inventory Report 92-4190.

Stevenson, M.M. and T.M. Buchanan. 1973. An analysis of hybridization between the cyprinodont fishes *Cyprinodon variegatus* and *C. elegans*. *Copeia* 1973: 682-692.

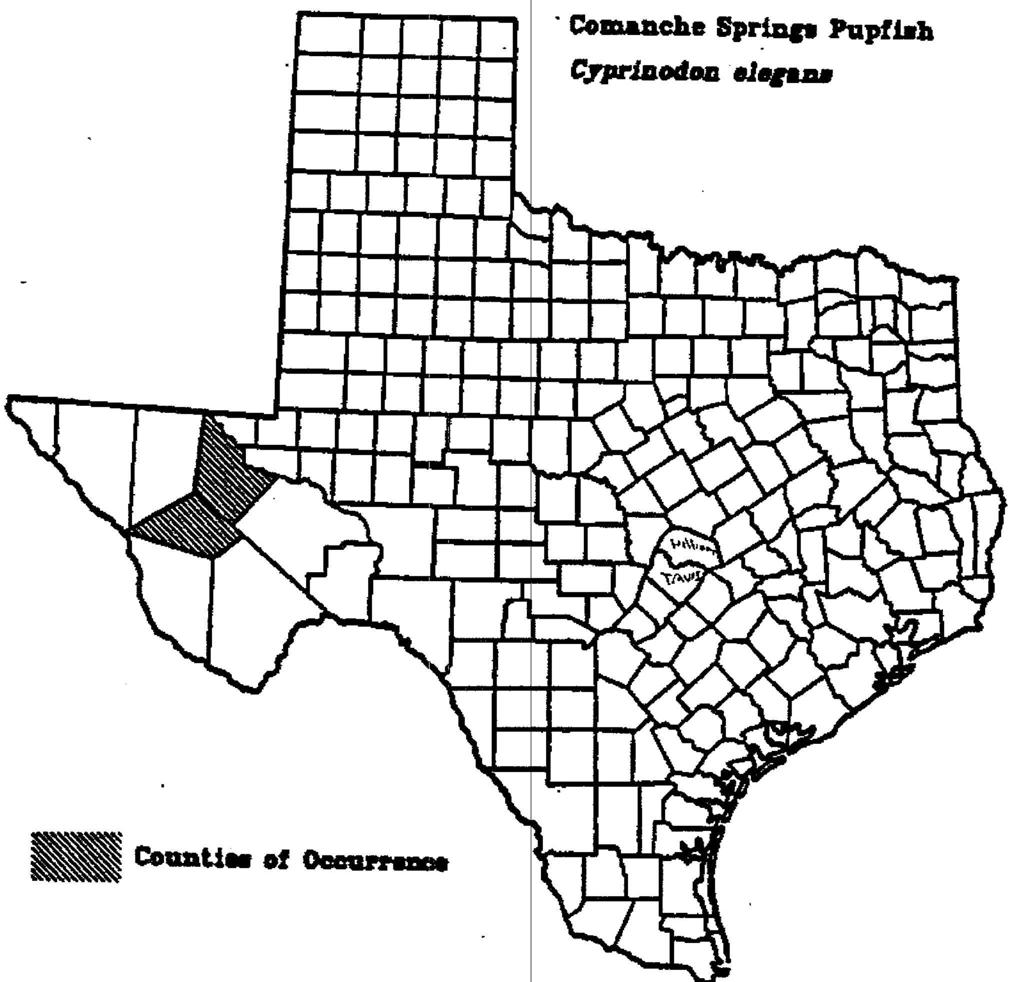
U.S. Fish and Wildlife Service. 1981. Comanche Springs Pupfish Recovery Plan. Albuquerque, NM. p. 25.

White, W.N., H.S. Gale, and S.S. Nye. 1941. Geology and ground-water resources of the Balmorhea area, western Texas. U.S. Geological Survey - Contributions to the hydrology of the United States, 1940. USGS Water Supply Paper 849-C, p. 83-146.

REV. DATE 6/95

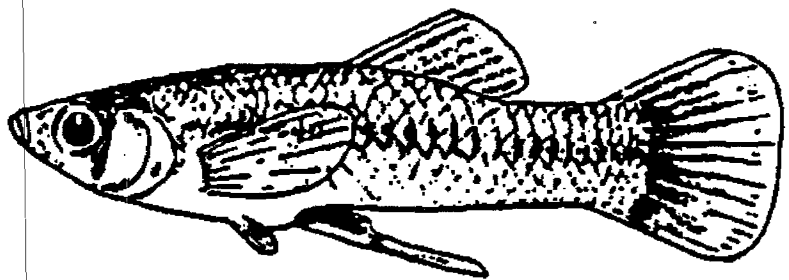
Comanche Springs Pupfish

Cyprinodon elegans



STATUS: Endangered (32 FR 4001-March 11, 1967) without critical habitat.

DESCRIPTION: A small, livebearing fish; reaches a maximum length of 2 in. Markings on this yellowish fish include a faint lateral stripe (the most pronounced mark on the body), orange and yellow dorsal and anal fins, a bar beneath the eye, and a faint, dark chin bar. Males are smaller than females.



HABITAT: Spring-fed marshes with dense aquatic vegetation (submerged and emergent), primarily *Chara* and cat-tail. Presumably, natural habitat was clear, shallow water fed by warm springs.

DISTRIBUTION:

Present: Restricted to small, spring-fed pools and runs near Rio Grande Village in Big Bend National Park, Brewster County, Texas.

Historic: Spring tributaries of the Rio Grande River in Big Bend National Park.

THREATS AND/OR REASONS FOR DECLINE: Habitat alteration, ground water pumping, declining springflows, competition and with introduced non-native species (western mosquitofish, *G. affinis*).

OTHER INFORMATION: Recovery plan completed in 1984. Recovery plan is undergoing revision. All present Big Bend gambusia descended from a population of one female and two males in 1956. Will reproduce in laboratory tanks; captive stock currently held at Dexter National Fish Hatchery and Technology Center in New Mexico.

REFERENCES:

Hubbs, C., and H.J. Brodrick. 1963. Current abundance of *Gambusia gaigei*, an endangered fish species. *Southwest. Natur.* 8:46-48.

Hubbs, C., G. Hoddenbach, and C.M. Fleming. 1986. An enigmatic population of *Gambusia gaigei*. *Southwest. Natur.* 31:121-123.

Hubbs, C., and D.T. Mosier. 1985. Fecundity of *Gambusia gaigei*. *Copeia* 1985:1063-1064.

Hubbs, C., and V.G. Springer. 1957. A revision of the *Gambusia nobilis* species group, with descriptions of three new species, and notes on their variation, ecology, and evolution. *Texas J. Sci.* 9:279-327.

Johnson, J.E., and R.H. Wauer. 1977. Habitat management plan for Big Bend gambusia, Big Bend National Park, Texas. U.S. Fish and Wildlife Service, Albuquerque, NM.

Meffe, G.K., and F.F. Snelson, Jr. (eds.). 1989. Ecology and evolution of livebearing fishes (Poeciliidae). Prentice Hall. Englewood Cliffs, New Jersey. p. xxv + 453.

National Park Service. 1988. Resources management plan for Big Bend National Park. Big Bend National Park, TX. 253 pp.

National Park Service. 1991. Big Bend National Park: statement for management (Draft). NPS-Southwest Regional Office, Santa Fe, NM. 44 pp.

National Park Service. 1992. Big Bend National Park Water Resources Scoping Report. Technical Report NPS/NRWRD/NRTR-92/08. 31 pp.

U.S. Fish and Wildlife Service. 1984. Big Bend Gambusia Recovery Plan. Albuquerque, NM.

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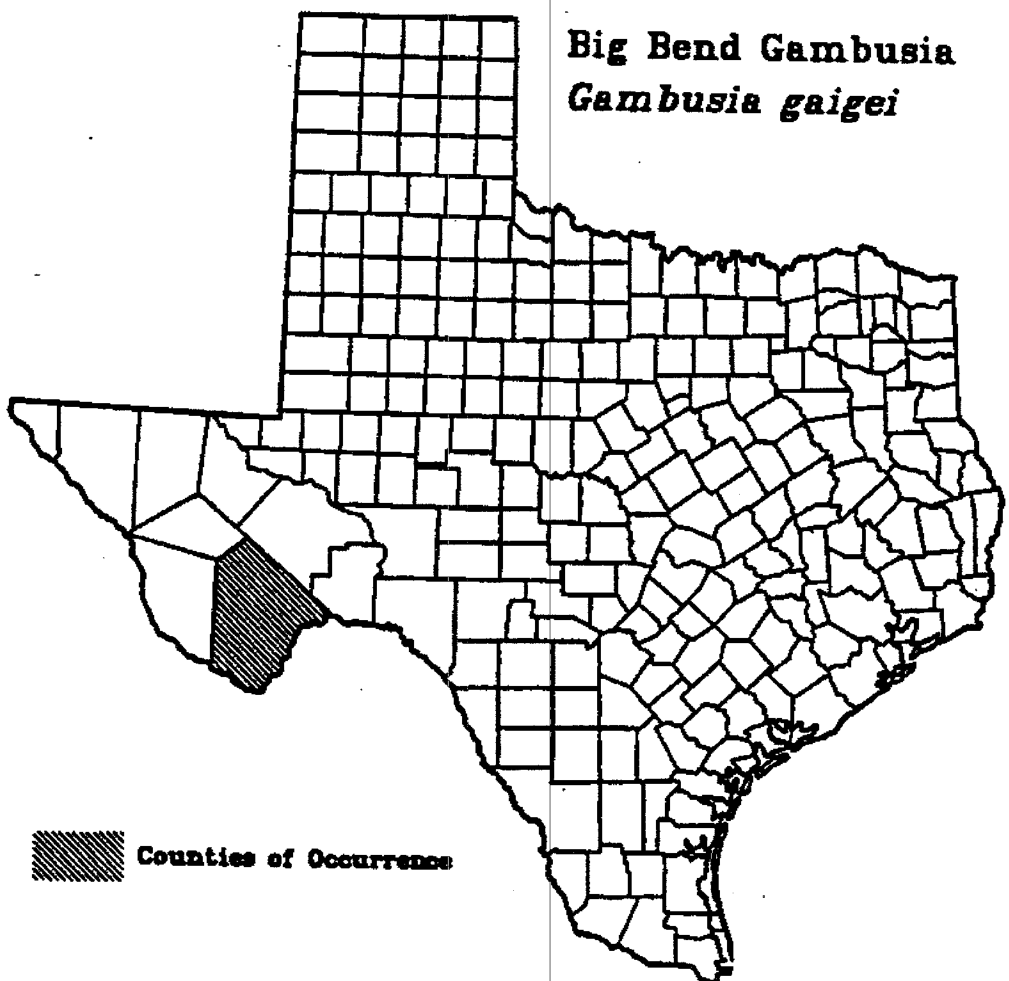
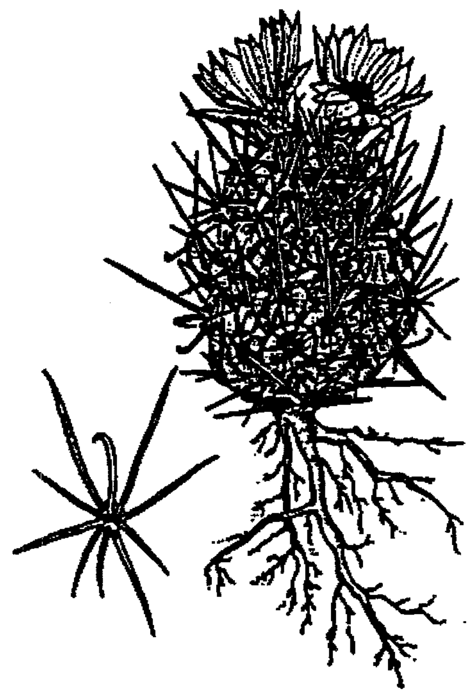

Big Bend Gambusia
Gambusia gaigei
Counties of Occurrence

STATUS: Endangered (44 FR 64736-November 7, 1979) without critical habitat.

DESCRIPTION: Rounded, biscuit-shaped cacti usually 2-3 inches tall (rarely 5 inches) and up to 3.5 inches in diameter. The dark green stems are usually solitary and partially hidden by spines on knobby tubercles about .25 inch long and broad. There are 3-5 central spines that are light yellow with red tips (fading gray). The upper 2-3 central spines are erect and straight, about 1-1.5 inches long. The lower central spines are hooked at the tip and spreading. The 7-12 outer (radial) spines are smaller (.5-.75 inch long), straight and needle-like. The relatively small flowers (1 to 1.5 inches long and wide) are yellow to cream with green to yellow stigmas. Blooming begins in February and is finished by mid-April. Fruits are fleshy and green, ripening with a pink or pinkish-brown flush, mature by late spring or early summer, with black seeds.

HABITAT: Occurs on limestone gravels of stream terraces, limestone ledges, ridges, and openings on the rocky hills of Live-oak juniper woodlands.



DISTRIBUTION:

<u>Present</u>: In Texas: Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde counties.

<u>Historic</u>: Same as present plus other counties of the Edward's Plateau of Texas.

THREATS AND REASONS FOR DECLINE: Overcollecting, real estate development, livestock damage, and flooding. Several populations suffered extreme population reduction as a result of major flooding in 1978.

OTHER INFORMATION: Seeds are black and each plant is capable of producing 20 seeds per fruit. Recovery Plan approved in 1987.

REFERENCES:

Benson, L. 1982. The cacti of the United States and Canada. Stanford University Press, Stanford, California, 1,044pp.
Marshall, W.T. 1952. A new and interesting cactus from Texas. Saguaroland Bull. 6:78-81.
Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.
Saustrup, A., and M.C. Johnston. 1977. Report on the status of *Ancistrocactus tobuschii*. Rare Plant Study Center, University of Texas, Austin.
U.S. Fish and Wildlife Service. 1987. Tobusch Fishhook Cactus Recovery Plan. Endangered Species Office, Albuquerque, NM.
Weniger, D. 1970. Cacti of the Southwest. University of Texas, Austin.

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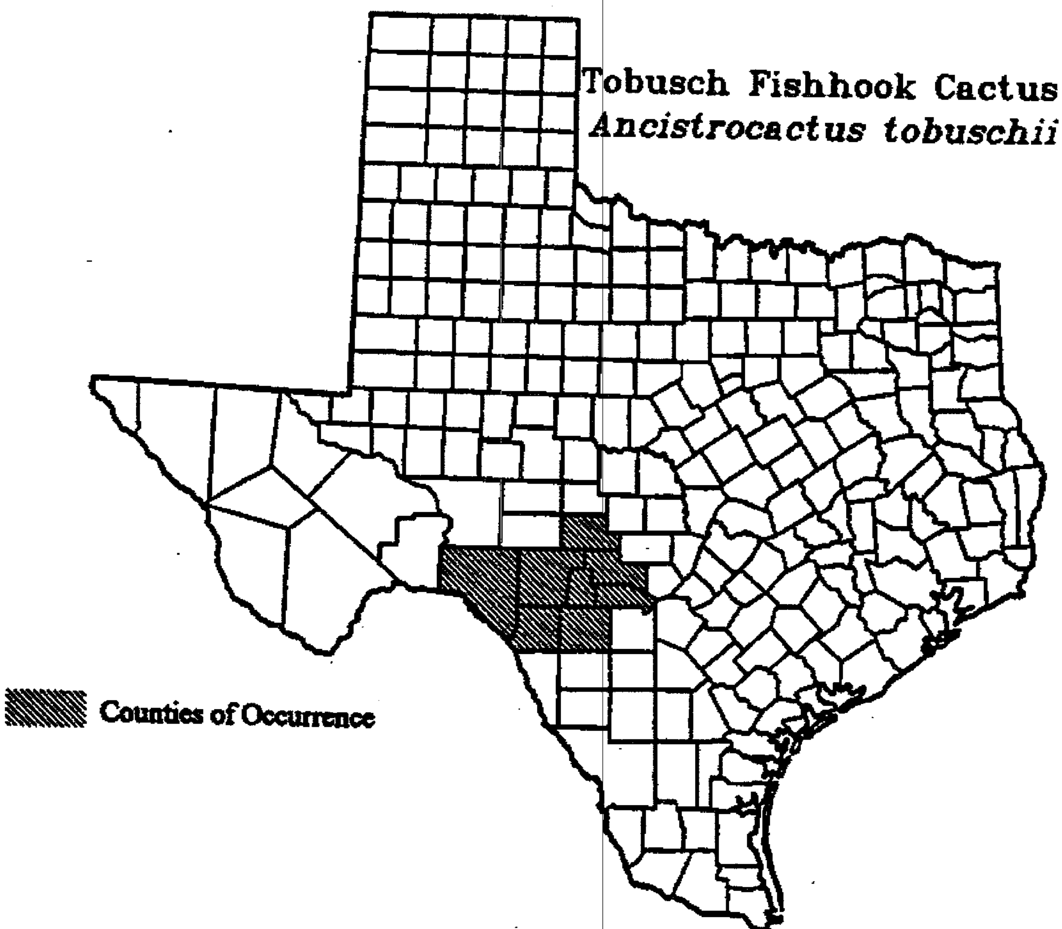

Tobusch Fishhook Cactus
Ancistrocactus tobuschii
Counties of Occurrence

Tobusch Fishhook Cactus (*Ancistrocactus tobuschii*)


TPWD Image

Tobush Fishhook Cactus in Bloom

Tobusch fishhook typically occurs on very shallow gravelly soil over limestone, shortgrass areas within live oak-juniper shrublands across the western Edwards Plateau in Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties. The species has been affected by over-collecting and habitat alteration. Since this cactus is so small, the best time to look for it is during the spring flowering period. The Tobusch Fishhook Cactus has been listed as endangered since 1979. Known occurrences are limited to about 35 populations in 8 counties

Tobusch fishhook cactus is round, usually 2 to 3 inches tall and up to 3.5 inches in diameter. The cactus has 3 to 5 central spines that are light yellow with red tips. The upper 2 to 3 central spines are straight and about 1 to 1.5 inches long. The lower central spines are hooked at the tip, like a fishhook. The 7 to 12 outer or radial spines are smaller (0.5 to 0.75 inches long), straight and needle-like.

Tobusch fishhook cactus produces yellow to cream flowers about 1 to 1 1/2 inches long and wide during February through March. The fruit is fleshy and green, ripening to pink or pinkish-brown by late spring or early summer. The seeds are black.

No occurrences of this species at Laughlin AFB have been documented by previous biological surveys. The lack of oak-juniper woodlands across the base indicates extensive suitable habitat for this species at Laughlin AFB is not present.

Texas Snowbells (*Styrax texanus*)

Texas snowbells is a shrub or small tree that grows out of crevices on steep limestone bluffs, rock ledges, or cliff faces along rivers, streams, and dry creek beds in the Edwards Plateau. It occurs with Spanish oak, agarita, egg-leaf silk-tassel, and woolly-bucket bumelia. Texas snowbells have been listed as endangered since 1984.

Texas snowbells grow only in three counties in central Texas. Since deer, goats, and exotic ungulates readily eat it, over-browsing is a serious threat to its survival. Browsing animals or insects often eat young seedlings.

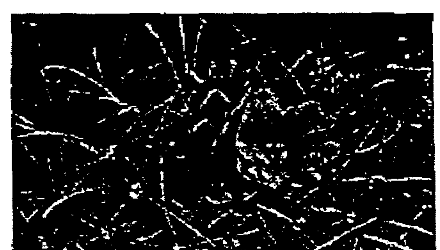
TAES Image by Benny Simpson

Texas Snowbells

Texas snowbells is a shrub or small tree growing to 15 feet in height, usually occurring along steep limestone bluffs, cliff faces, rock ledges, or gravel bars along rivers or streams across the western Edwards Plateau in Edwards, Real, and Val Verde Counties. The known occurrences are limited to about 20 populations in Edwards, Real, and Val Verde Counties.

The species is identified by the big, round leaves that are shiny and green on top but white and fuzzy underneath. The contrasting colors on the leaves make the plant appear to shimmer when the wind blows. The flowers hang upside down and are clustered at the end of the branch. The flowers are white with bright yellow-orange pistils and stamens that develop in April. The flowers dangle and look like small white bells, thus the name "snowbells."

While the lack of open grazing across Laughlin AFB could increase the potential for occurrence upon the base, browsing by deer and other native species could preclude the existence of this plant at the base. The lack of limestone outcrops and cliff faces along waterways does not favor establishment of this species at Laughlin AFB. No sightings of this species have been recorded by the biological studies conducted at the base.



STATUS: Endangered (56 FR 49634-September 20, 1991) without critical habitat.

DESCRIPTION: *Cryptantha crassipes* is a perennial member of the Borage family (Boraginaceae) growing up to 2 feet tall. Hairy overall, with a silvery appearance, the species has erect, slender stems. Leaves are narrow, up to 3 inches long and .25 inch wide, white with hairs and bristles, and form a dense mound at the base of the plant. Several stem leaves are present, which narrow at the apex, and become progressively smaller up the stem. Flowers are born in a dense, terminal, rounded, head-like cluster about one inch in diameter. Individual flowers are tubular, expanding to 10 mm diameter, 5-lobed border around the central opening. The corolla is white with yellow throat, and yellow knobs showing above the laid back "petal" lobes. The fruit is also hairy, and consists of four egg-shaped nutlets.

HABITAT: The plants grow in full sunlight on xeric, gypsiferous, and chalky shales. Occurs on soils of the Badland-Vieja association. The species grows on low hills and gentle slopes of the Trans-Pecos shrub. Associated species include Havard buckwheat, perennial spurge, Schott acacia, gypsum springstem, mormon tea, and creosote bush. Vegetation is sparse, and indicative of the high gypsum content of the substrate.

DISTRIBUTION:

<u>Present</u>: In Texas, Brewster County; limited to the area near the Agua Fria Mountains.

<u>Historic</u>: Same as present.

THREATS AND REASONS FOR DECLINE: Habitat modification and destruction through road building, potential development, roadway maintenance, and recreational off-road-vehicles (ORV's).

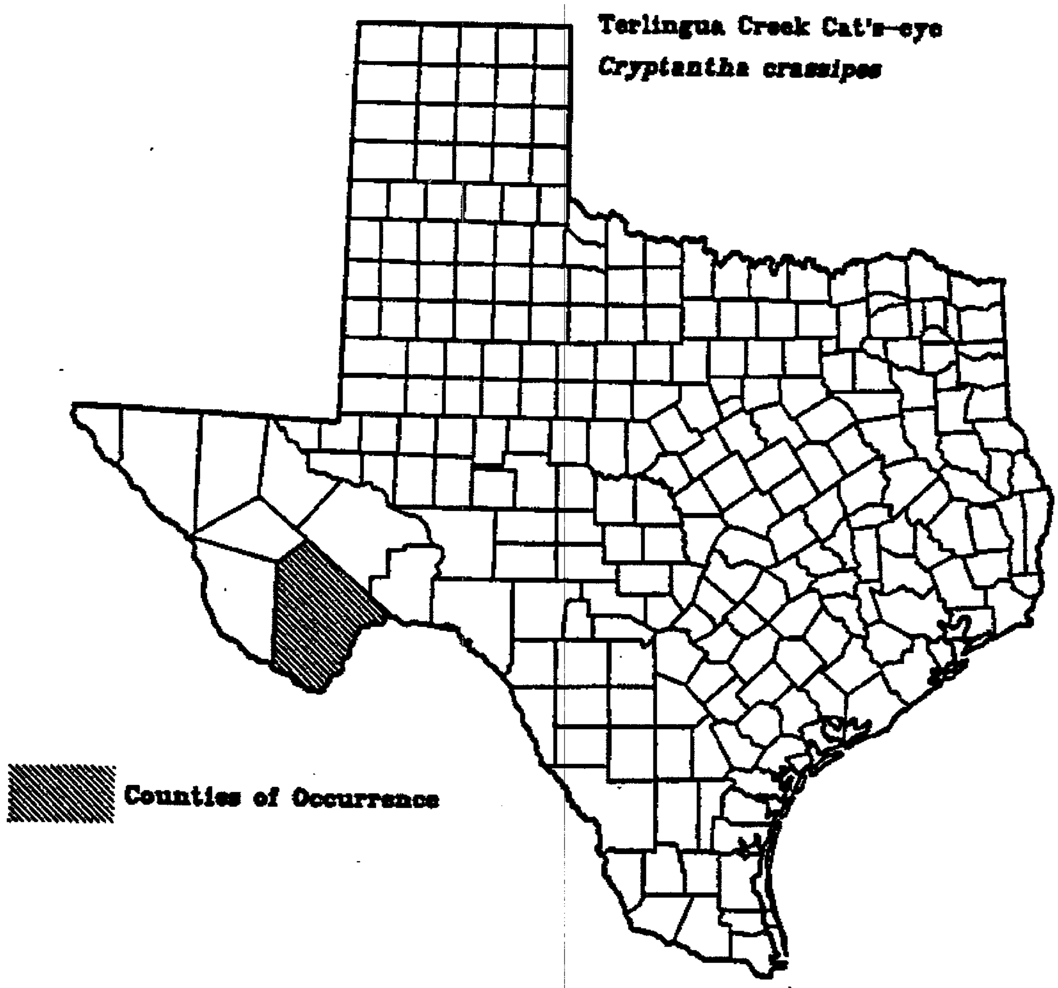
OTHER INFORMATION: Only ten scattered populations are presently known, with less than 5,000 individuals. All are mature individuals with no juveniles or seedlings reported. The species flowers from late March to early June and fruiting is between April and July. Recovery plan approved in 1994.

REFERENCES:

Poole, J.M. 1987. Status report on *Cryptantha crassipes*. Texas Parks and Wildlife Department. Austin, Texas 23pp.

U.S. Fish and Wildlife Service. 1994. Terlingua Creek Cat's-eye (*Cryptantha crassipes*) Recovery Plan. U.S. Fish and Wildlife Service, Austin, Texas. 69pp.

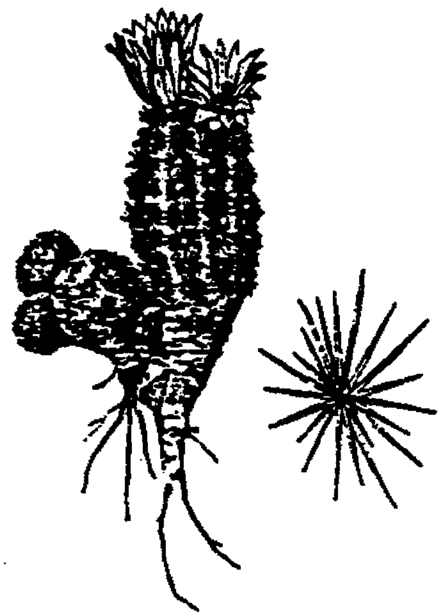
REV. DATE 6/95


Terlingua Creek Cat's-eye
Cryptantha crassipes
Counties of Occurrance

STATUS: Endangered (44 FR 64743-November 7, 1979) without critical habitat.

DESCRIPTION: Plants are many-branched, forming tight clumps over a foot in diameter, with up to 100 stems on older plants. Stems are usually up to 3 inches long and 1.25 inches in diameter, rounded to cylindrical or club-shaped, and green. Spines are needle like and numerous, hiding the stem. Each spine cluster may have up to 90 outer (radial) spines, which are straight, .5 inch long, white and spreading. Inner (central) spines usually number 6-9 (occasionally more) are up to .6 inch long and white with pink or lavender to brown tips. Flowers are magenta. Inner petals are white or pink to magenta in the middle, sharp pointed at the tip and fringed below. Anthers have pink stalks and bright orange tips. Stigmas are white to cream colored. Fruit are fleshy and green or green tinged with brown or pink to red, and about .4 inch long, with reddish-brown seeds.

HABITAT: Limestone ledges in the Chihuahuan Desert and grassland between 3,900 to 7,000 feet in elevation. Cracks on vertical cliffs or ledges of limestone mountains with creosote bush, ocotillo, lechuguilla, beargrass, and various cacti.



DISTRIBUTION:

__Present__: In Texas, El Paso County. In New Mexico, Eddy and Dona Ana Counties.

__Historic__: Same as present.

THREATS AND/OR REASONS FOR DECLINE: Overcollecting, habitat loss and degradation due to highway construction and urban development, competition, and predation.

OTHER INFORMATION: This cactus blooms at three to four years of age, from April to September. Fruiting occurs between June and November. Each plant is capable of producing 140 seeds per year with high survival rates and seeds remain viable for up to 10 years. Primary seed dispersal agents are rodents, birds, and water.

REFERENCES:

Benson, L. 1969. The Cacti of the United States and Canada- new names and nomenclatural combinations. Cact. and Succ. J. 41:127.

Britton, N.L., and J.N. Rose. 1922. The Cactaceae. Volumes 3 & 4. Dover Publications, New York.

Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

Saustrup, A. and M.C. Johnston. 1977. Report on the Status of *Coryphantha sneedii var. sneedii*. Rare Plant Study Center, University of Texas, Austin.

U.S. Fish and Wildlife Service. 1986. Sneed Pincushion Cactus Recovery Plan. Endangered Species Office, Albuquerque, NM. 53pp.

Weniger, D. 1970. Cacti of the Southwest. University of Texas Press, Austin.

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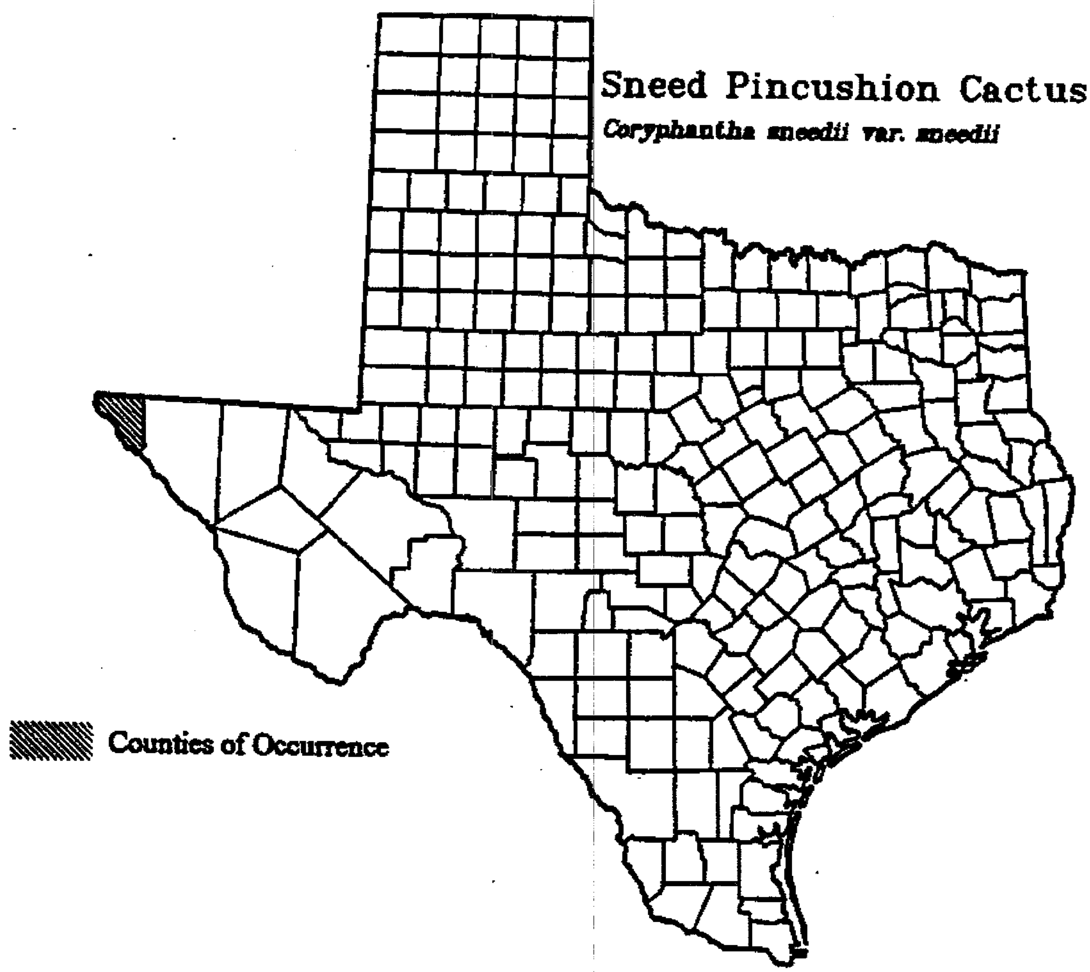
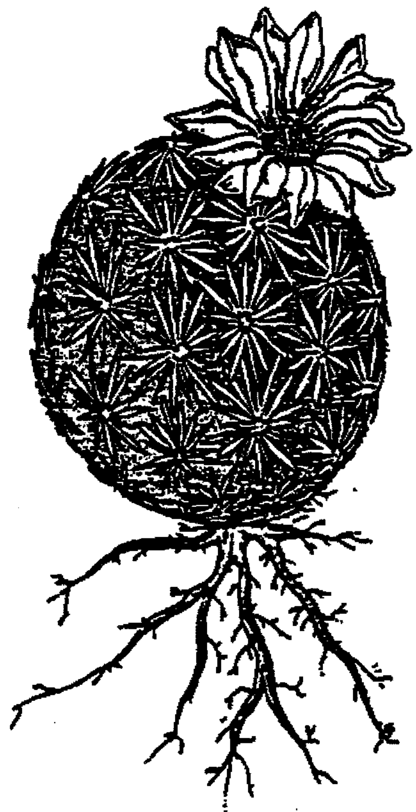


Map only shows Texas range

STATUS: Endangered (44 FR 64738-November 7, 1979) without critical habitat.

DESCRIPTION: Stems usually single, dark green, rounded or cylindrical, and very small, only .5-1 inch long and .25-.75 inch in diameter. Individual tubercles are about .2 inch in diameter and protrude slightly. The spines are unique because they do not taper gradually, but abruptly reach a point, giving a club-shaped appearance to the spine. Each spine cluster has a wooly cone or egg-shaped center and 15-27 spines arranged in 2-3 series, with the smallest spines outermost. Spines spread parallel to the stem, to .25 inch long, and ashy gray or pinkish. Flowers are pale pink to reddish purple, up to .6 inch long and 1 inch wide. Petals are lance-shaped with fringe-like margins, stamens are greenish to yellow and the stigma is green with 4-8 lobes. Fruits are green, egg-shaped, and up to .25 inch long, with small, black, pitted seed.

HABITAT: Grows on rocky and gravelly soil in rock crevices on outcrops of novaculite. Occurs in full sun among sparse Chihuahuan Desert grassland.



DISTRIBUTION:

Present: In Texas, Brewster County.

Historic: Same as present.

THREATS AND REASONS FOR DECLINE: Overcollecting, limited distribution and low numbers, and habitat degradation.

OTHER INFORMATION: This cactus flowers from March to June (flower lasts 2-3 days), and fruit matures from June to October. First reproduction is at 3 to 4 years of age. Each fruit is capable of producing 80-100 seeds, which can remain viable for 5 to 10 years. Evidence suggests that seedling survival on suitable habitat is good.

REFERENCES:

Baird, R.O. 1931. A new species of cactus. American Botanist 37:150-151.

Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

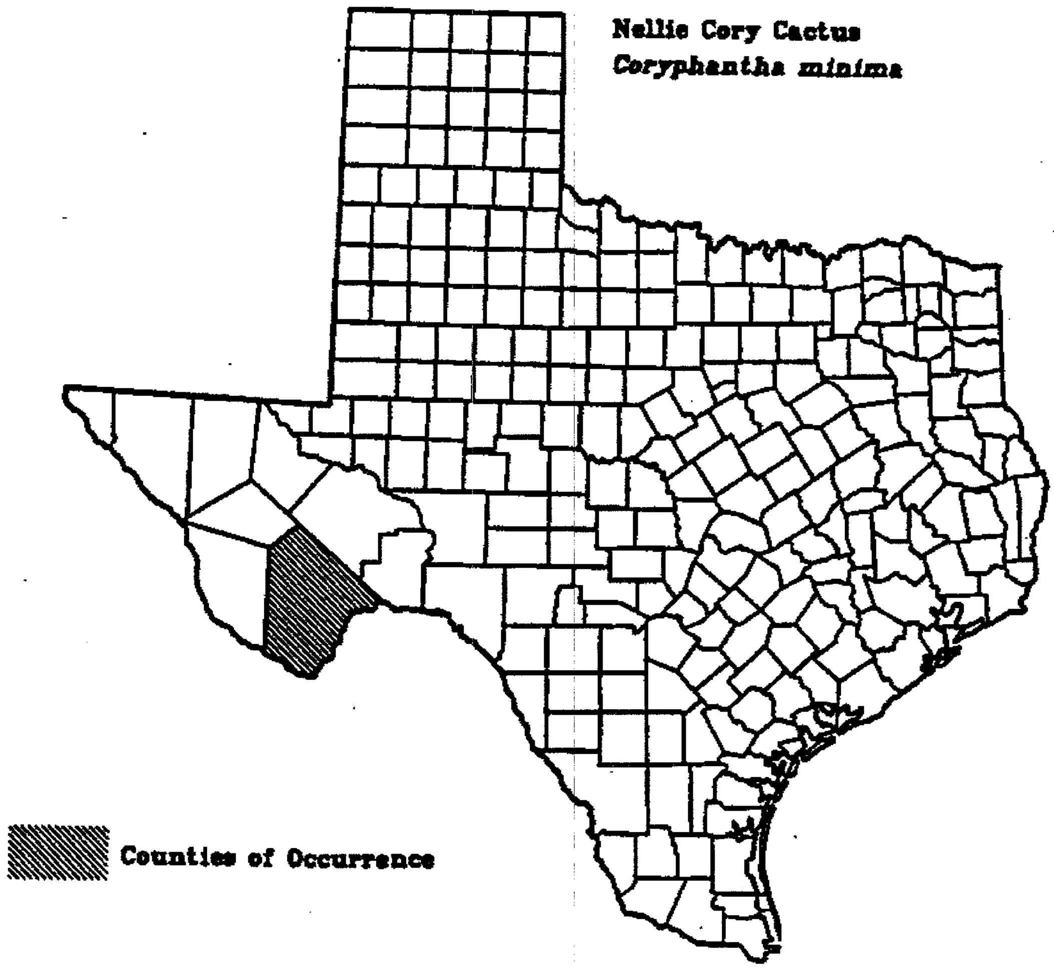
Saustrup, A. and M.C. Johnston. 1977. Report on the status of *Coryphantha minima*. Rare Plant Study Center, University of Texas, Austin.

U.S. Fish and Wildlife Service. 1984. Nellie Cory Cactus Recovery Plan. Endangered Species Office, Albuquerque, NM.

Weniger, D. 1970. Cacti of the Southwest. University of Texas Press, Austin.

REV. DATE 6/95

Nellie Cory Cactus
Coryphantha minima

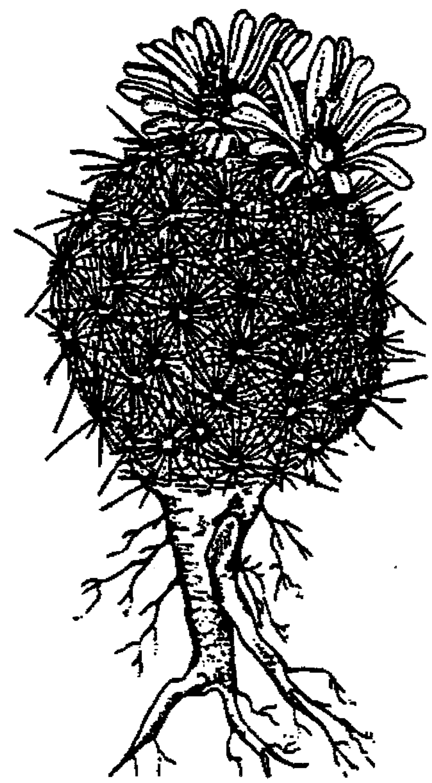


Counties of Occurrence

STATUS: Threatened (44 FR 64247-November 6, 1979) without critical habitat.

DESCRIPTION: Stems are single, blue-green, spherical to egg-shaped, and grow up to 4 inches tall. Spines are very dense and obscure the stem. There are 25-35 outer (radial) spines up to 3/8 inch long, white to gray needlelike and straight, arranged in files like the teeth of a comb and spread evenly and parallel to the stem. There are 2-4 central spines per areole (spine cluster); these are dull tan with chalky blue or partly brown tips; the lower ones curve downward and are up to 5/8 inch long, while the upper ones curve upward and are longer, up to about 7/8 inch. Flowers are green to pinkish, about 1.25 inches long and 1.5 inches wide, outer petals with pink margins and inner petals with white margins. The stamens are cream to pink, and the stigma is green and 5-8 lobed. Fruits are up to 3/8 inch long, round or oblong, splitting on one side when dry, releasing black, warty, egg-shaped seeds about 1/16 inch long.

HABITAT: Generally found in barren, alkaline, limestone soils of hills and ridges in the Chihuahuan Desert at elevations ranging from 2,600-3,800 feet. Plants occur in full sun patches of limestone chips, and the reflection from the whitish rock raises the heat and light radiation to extremes. Climate is warm and arid. This cactus occurs close to creosote bush, lechuguilla, ocotillo, candelilla, leather stem, and other cacti.



DISTRIBUTION:

<u>Present</u>: In Texas: south and southeastern Brewster County. In Mexico: in the Coahuila region.

<u>Historic</u>: Same as present.

THREATS AND REASONS FOR DECLINE: Small numbers and limited distribution, overcollecting, habitat loss and degradation due to mining and trampling on overgrazed lands.

OTHER INFORMATION: The species flowers from March to July and fruits from April to August. Recovery Plan approved in 1987; updated in 1989.

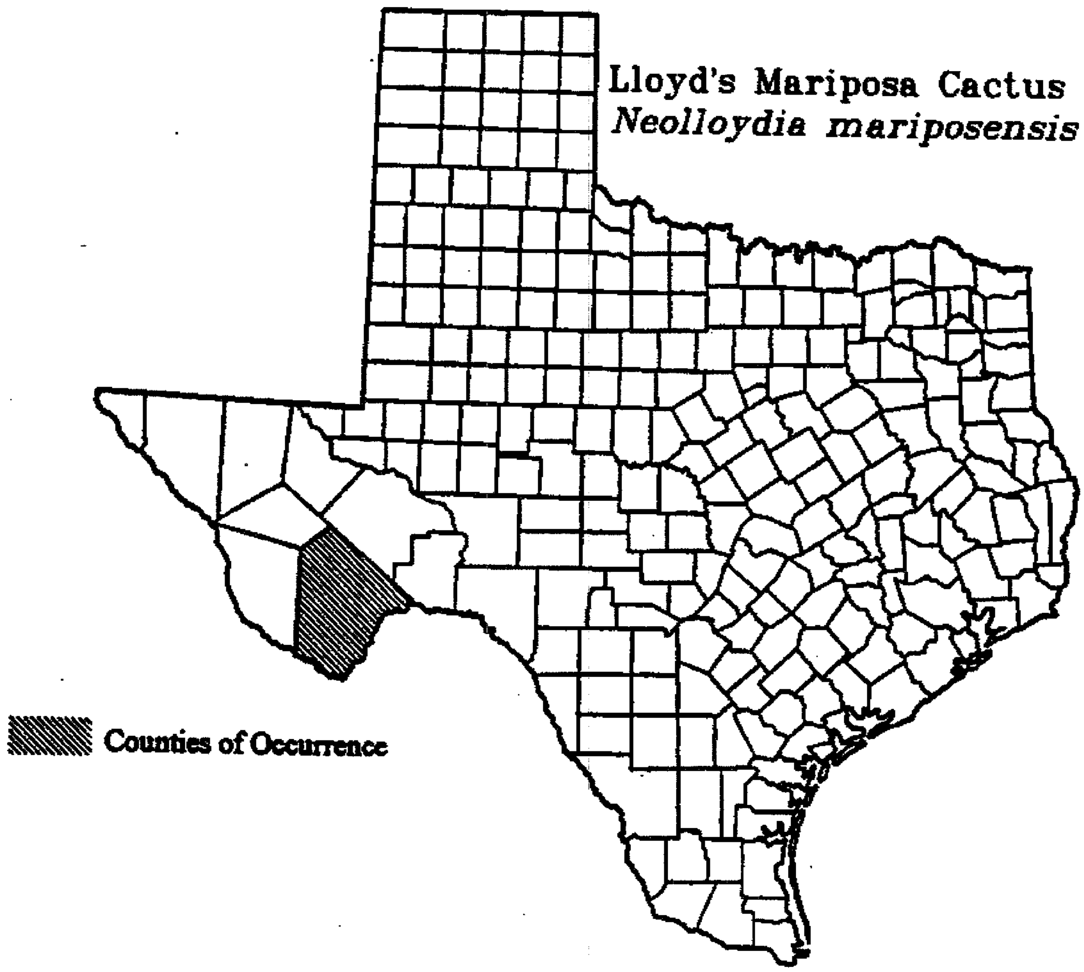
REFERENCES:

Benson, L. 1982. The cacti of the United States and Canada. Stanford University Press, Stanford, California, 1,044pp.

Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

U.S. Fish and Wildlife Service. 1989. Lloyd's Mariposa Cactus Recovery Plan. Endangered Species Office, Albuquerque, NM. 35pp.

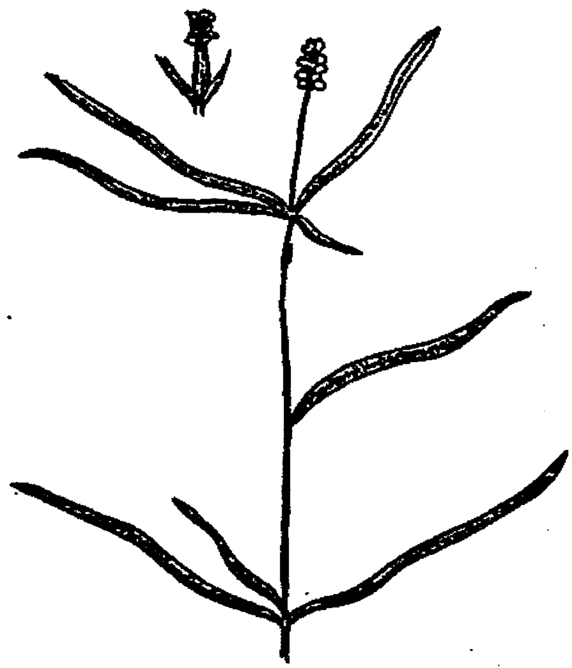
REV. DATE 6/95



Map only shows Texas range

STATUS: Endangered (56 FR 57844-November 14, 1991) without critical habitat.

DESCRIPTION: A member of the pondweed family (Potamogetonaceae), Little Aguja pondweed is a totally submersed aquatic plant, with much branched, slender stems, usually with a pair of small translucent glands at the leaf nodes. The linear leaves are about 1/8 inch wide and up to 4 1/2 inches long. The leaves are light green and may have an almost translucent appearance, with clasping basal appendages (stipules) whose margins are free. Flowers are in 2-3 rings (whorls) on short (up to 3/8 inch) cylindrical spikes. The spikes have thread-like stalks up to 2 1/2 inches long, and extend above the water's surface while flowering. Flowers are small, only about 1/8 inch wide, with 4 "petals" (tepals). Fruits are oval, to nearly round, with 2 or more warty projections near the base, and are about 3/16 inch long and 1/16 inch wide.



HABITAT: The species is endemic to intermittent streams of Little Aguja Canyon of the Trans-Pecos region. Occurs in isolated quiet pools in igneous derived alluvium of the streambed draining Little Aguja Canyon.

DISTRIBUTION:

Present: In Texas: Jeff Davis County, Little Aguja Canyon drainage.

Historic: Same as present.

THREATS AND REASONS FOR DECLINE: Drought, flood, changes in water quality, very low population numbers, and possibly recreational activities that increase pollution or disturbance, and activities that reduce water available in the creek habitat.

OTHER INFORMATION: Fruiting occurs from early May to October. Little Aguja pondweed is very similar in appearance to three other species of pondweed that occur with it. Characteristics of the stipules and fruit are important for accurate identification. Recovery plan approved 1994.

REFERENCES:

Fernald, M.L. 1932. The linear-leaved North American species of Potamogeton, section Axillares. Mem. Gray Herb. 3:79.

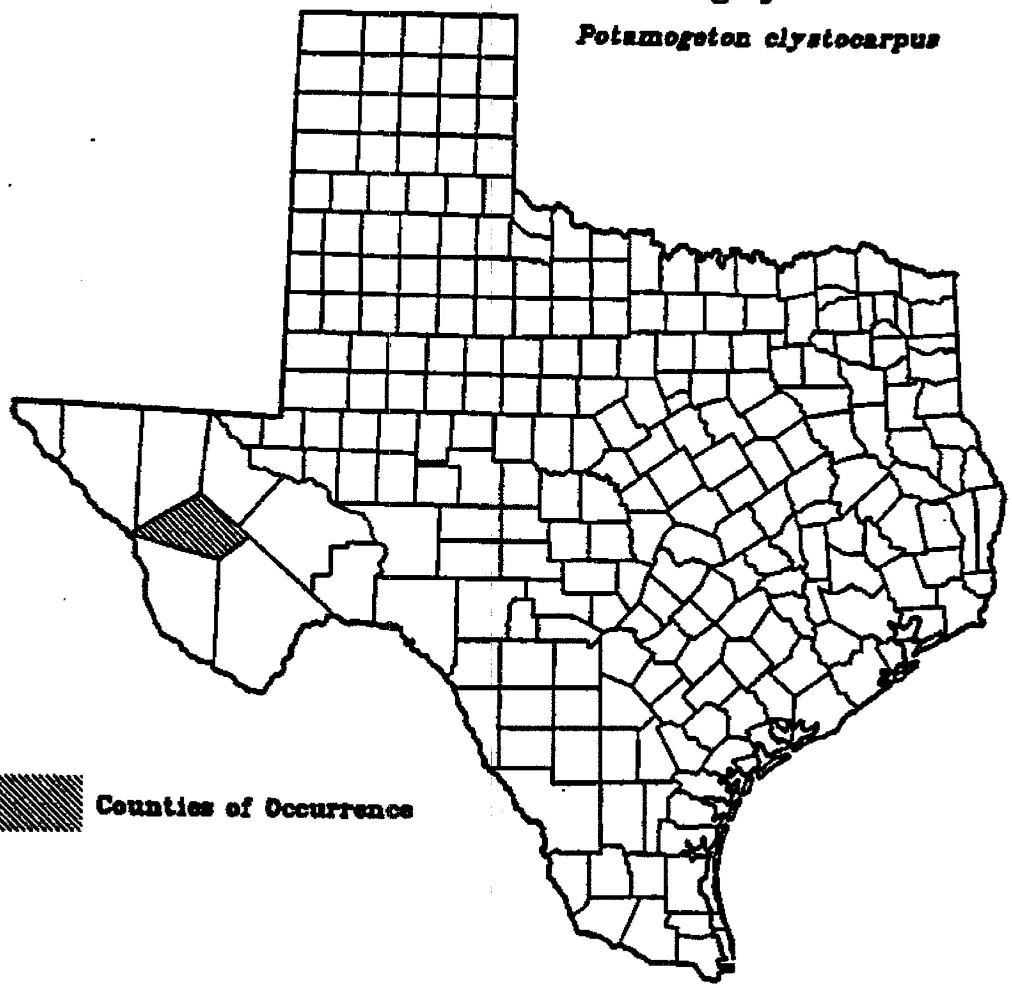
Rowell, C.M., Jr. 1983. Status Report, *Potamogeton clystocarpus* Fern. U.S. Fish and Wildlife Service, Office of Endangered Species, Albuquerque, NM. 9pp.

U.S. Fish and Wildlife Service. 1994. Little Aguja Pondweed (*Potamogeton clystocarpus)* Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, NM. 78pp.

REV. DATE 6/95

Little Aguja Pondweed

Potamogeton clystocarpus

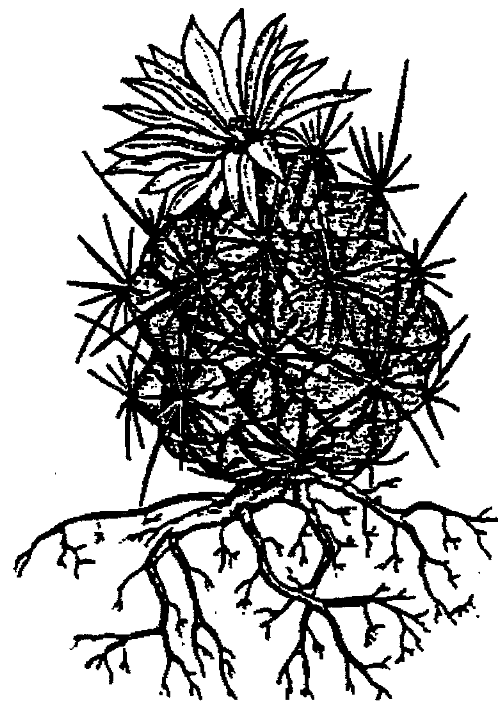


Counties of Occurrence

STATUS: Threatened (44 FR 64247-November 6, 1979) without critical habitat.

DESCRIPTION: Stems are dark grayish green, usually single, and rounded, up to about 3.5 inches tall and 3.75 inches in diameter, with slightly protruding (.3 inches), cone shape tubercles. There are numerous needle-like spines, that do not completely hide the stem. There are 9-20 outer (radial) spines that are .5-.75 inch long, and dull white. Inner (central) spines are usually 4 or 5, arranged with one long (1-1.5 inches long) dark brown lower spine projecting outward from the stem, and upper spines pointing upward, shorter (.75- 1 inch), and white with some brown. Flowers are funnel shaped, 1-1.5 inches long and up to 2 inches wide, and pale pink to a deep rose purple. Outer petals are greenish purple, narrow (.25 inch wide) and lance-shaped. Inner petals are also lance-shaped, but broader above than below and with white bases. Anthers are yellow and the stigma is white. Fruits are egg-shaped, and up to 1 inch long with small (.06 inch), brown, kidney-shaped seeds.

HABITAT: This member of the Chihuahuan Desert Scrubland community occurs on limestone rock on ledges, slopes, flats, and outcrops generally at elevations between 2,500 and 3,500 feet. It is confined to rocky, well-drained, and full sunlit sites. It occurs with lechugilla, beargrass, yucca, ocotillo, and other cacti. Mean annual rainfall is 12 inches and mean annual temperature is 65°F.



DISTRIBUTION:

> __Present__: In Texas, southern and southeastern Brewster and southwestern Terrell Counties. Extends to northwestern Coahuila, Mexico.
>
> __Historic__: Same as present.

THREATS AND REASONS FOR DECLINE: Habitat degradation and trampling on overgrazed lands, overcollecting, limited range and small numbers.

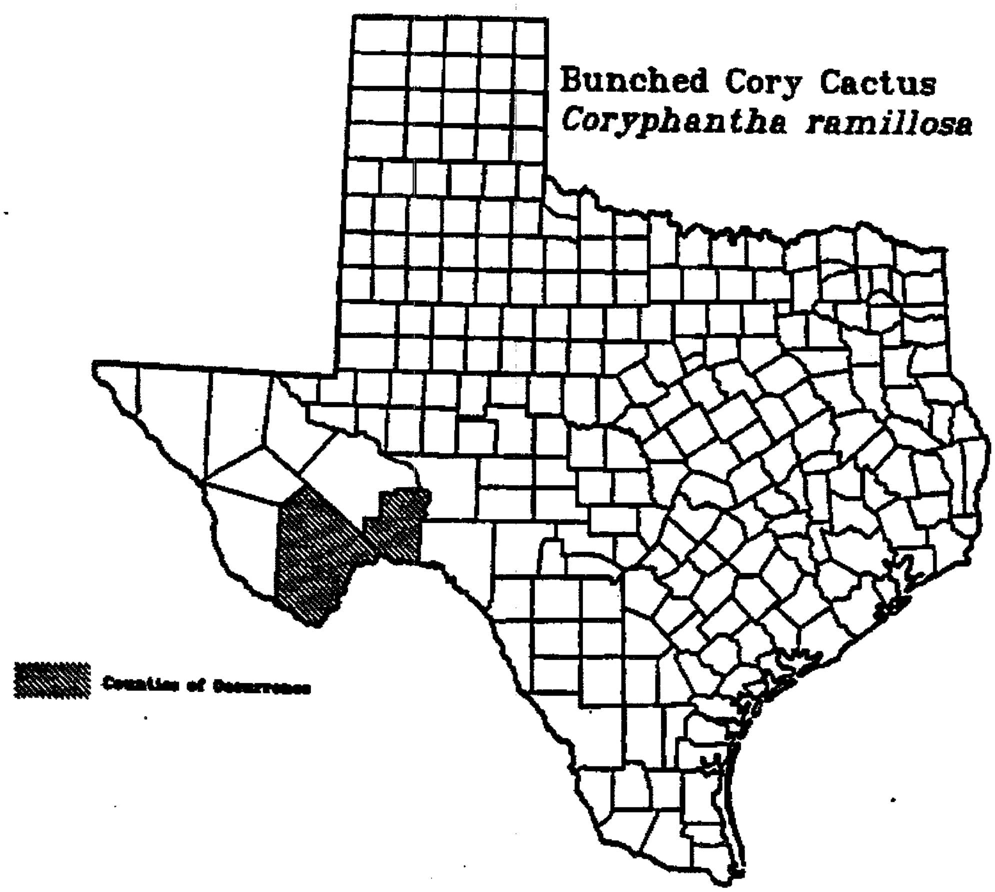
OTHER INFORMATION: Begins blooming at an age of 5 years. It blooms from April to June; fruit matures in the summer, with 75 seeds per fruit on average. Major pollinator is a green sweat bee (Halictidae). Seedlings thrive best in shade of rocks or deep cracks where they are protected against desiccation and predation. Recovery Plan finalized in 1989.

REFERENCES:

Poole, J.M., and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

Saustrup, A and M.C. Johnston. 1977. Report on the status of *Coryphantha ramillosa*. Rare Plant Study Center, University of Texas, Austin.

U.S. Fish and Wildlife Service. 1989. Bunched Cory Cactus Recovery Plan. Endangered Species Office, Albuquerque, NM.



Map only shows Texas range

STATUS: Threatened (53 FR 38453-September 30, 1988) without critical habitat.

DESCRIPTION: Deep green to blue-green or yellow-green stems. Single (rarely branching), slender cylinders to 8 inches tall and 2 inches in diameter, with 13-16 ribs of distinct tubercles, with ridges separated by broad "valleys". Spines are relatively sparse and do not hide the stem. There are 10-15 outer (radial) spines in each spine cluster, white or gray below and maroon or red-brown above, and spaced evenly parallel to the stem. These outer spines are thin and bristle-like, and vary in length. The upper ones are about 1/16 to 1/8 inch long, the lower ones get progressively longer toward the bottom, up to 3/4 inch long. There are 1-4 inner spines, black to dark brown with whitish bases, with one spine more erect and pointing outward from the stem, the others more spreading. Flowers usually do not open widely, are about 2.5 inches long and .5 inches wide, and rose-colored with reddish centers. Petals are upright with pointed tips. The pistil is white except for the tip (stigma), which is 10-lobed and green. Fruit is club-shaped, red and fleshy, about an inch long and .5 inch in diameter. The egg-shaped warty black seeds are released as the fruit dries and splits.

HABITAT: Occurs in desert grasslands or shrublands at elevations generally between 1,000 to 3000 feet. Vegetation is very sparse, including dog cholla, creosote bush, lechuguilla, ocotillo, and leatherstem. It grows on bare soil with spreading clumps of *Opuntia schottii* and is also found in the shade of other plants.

DISTRIBUTION:

<u>Present</u>: In Texas, Big Bend National Park area, Brewster County.

<u>Historic</u>: Same as present.

THREATS AND/OR REASONS FOR DECLINE: Overcollecting, road maintenance, and trail construction. Habitat degradation from former overgrazing. Also limited distribution and low numbers hinder the species' survival.

OTHER INFORMATION: The species flowers from March to early June and fruit matures from May to August. Each fruit contains 200 to 250 seeds. Recovery Plan approved, 1993.

REFERENCES:

Benson, L. 1969. The Cacti of the United States and Canada- new names and nomenclatural combinations. Cact. and Succ. J. 41:127.

Evans, D.B. 1986. Survey of Chisos pitaya (*Echinocereus reichenbachii var. chisoensis*). U.S. Park Service, Big Bend National Park, Texas 18pp.

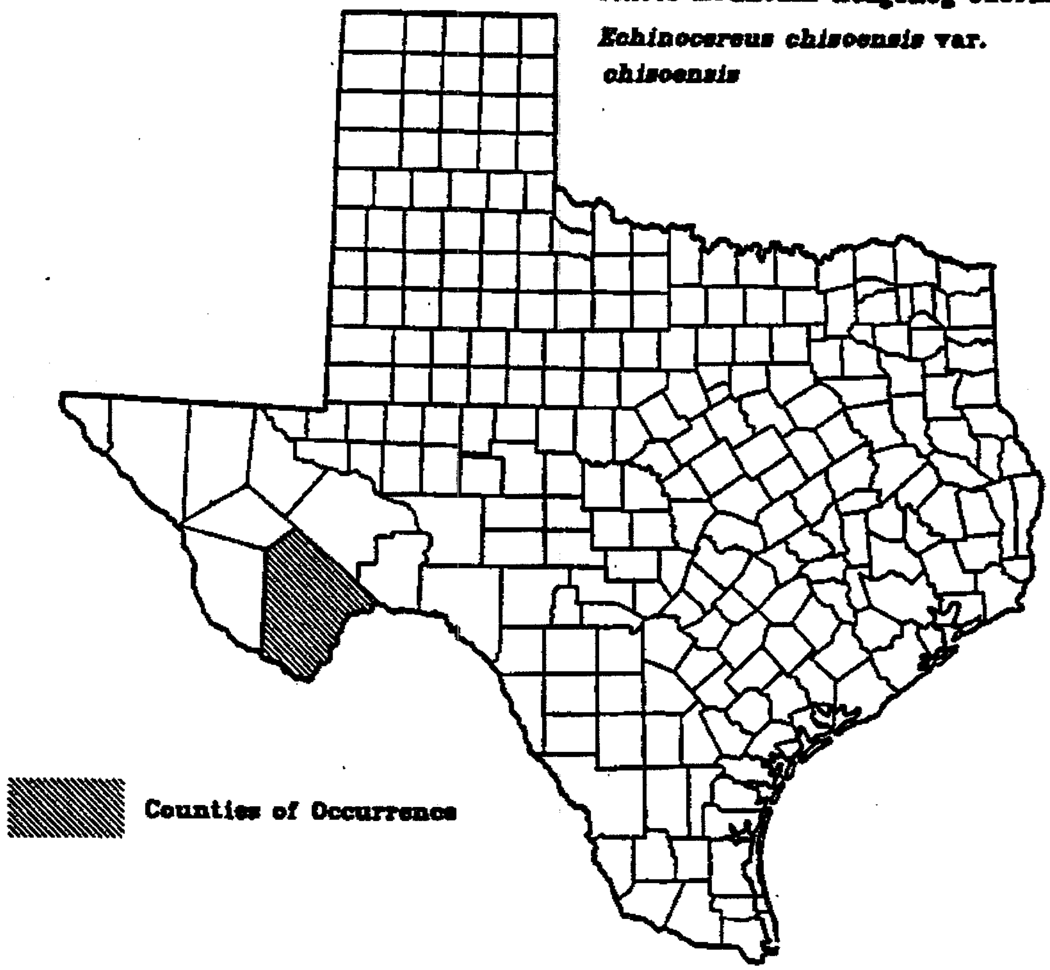
Heil, K. D., and E. F. Anderson. 1982. Status report on *Echinocereus chisoensis*. U.S. Fish and Wildlife Service, Endangered Species Office, Albuquerque, NM. 9pp.

Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

U.S. Fish and Wildlife Service. 1993. Chisos Mountain Hedgehog Cactus (*Echinocereus chisoensis var. chisoensis*) Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 60pp.

Chisos Mountain Hedgehog Cactus

Echinocereus chisoensis* var. *chisoensis

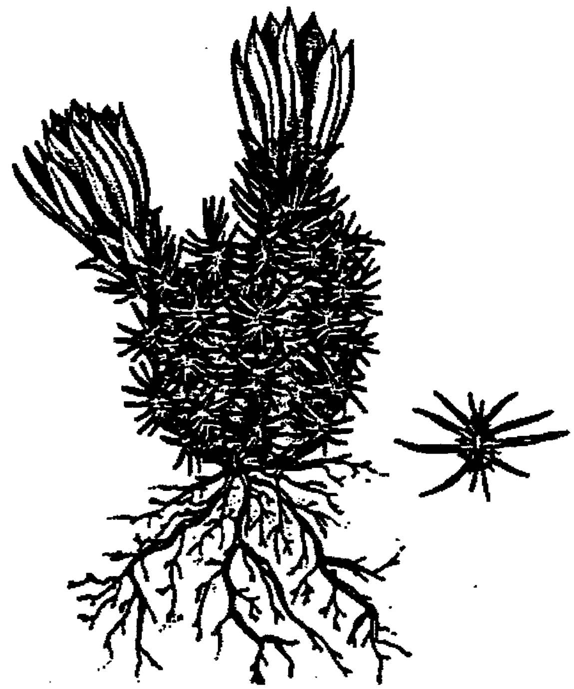


Map only shows Texas range

STATUS: Endangered (44 FR 64738-November 7, 1979) without critical habitat.

DESCRIPTION: The smallest member of its genus; the solitary stems are up to 1 inch tall and 0.5 inch in diameter, mostly underground and are often covered by other low-growing plants such as *Selaginella* sp. (little club moss). Stems have 6-9 ribs, and spine clusters only partly hide the stem. Spines are straight or curving upward, and vary from reddish purple to gray to white, and often tipped with red. Central spines are usually absent, occasionally one is present, up to .5 inch long. There may be 8-14 outer (radial) spines per cluster, arranged like the teeth of a comb, the upper ones shorter than the lower ones, which may be up to 5/16 inch long. Flowers are greenish-yellow up to 1 inch long and 3/4 inch in diameter with pale green to yellow stamens and a pale green pistil. Fruit are green, dry, egg-shaped, and small, only .25-.5 inch long and .25 inch in diameter.

HABITAT: Rock crevices on novaculite formation ridgetops in full sun among sparse Chihuahuan Desert scrub where mean annual precipitation is about 17 inches.



DISTRIBUTION:

<u>Present</u>: In Texas, Brewster County.

<u>Historic</u>: Same as present.

THREATS AND/OR REASONS FOR DECLINE: Overcollecting, limited range and numbers, competition, and habitat loss.

OTHER INFORMATION: Begins to bloom after 3-4 years and its seeds can remain viable 5-10 years. Flowers from March to April, fruits from April to May, and is capable of producing from 85 to 340 seeds per plant. Major pollinator for the species is a metallic green, sweat bee member of the Hallictidae family. The species is long-lived in cultivation. Recovery Plan approved in 1984.

REFERENCES:

Benson, L. 1982. The Cacti of the United States and Canada. Stanford University Press, Stanford, California 1,044pp.

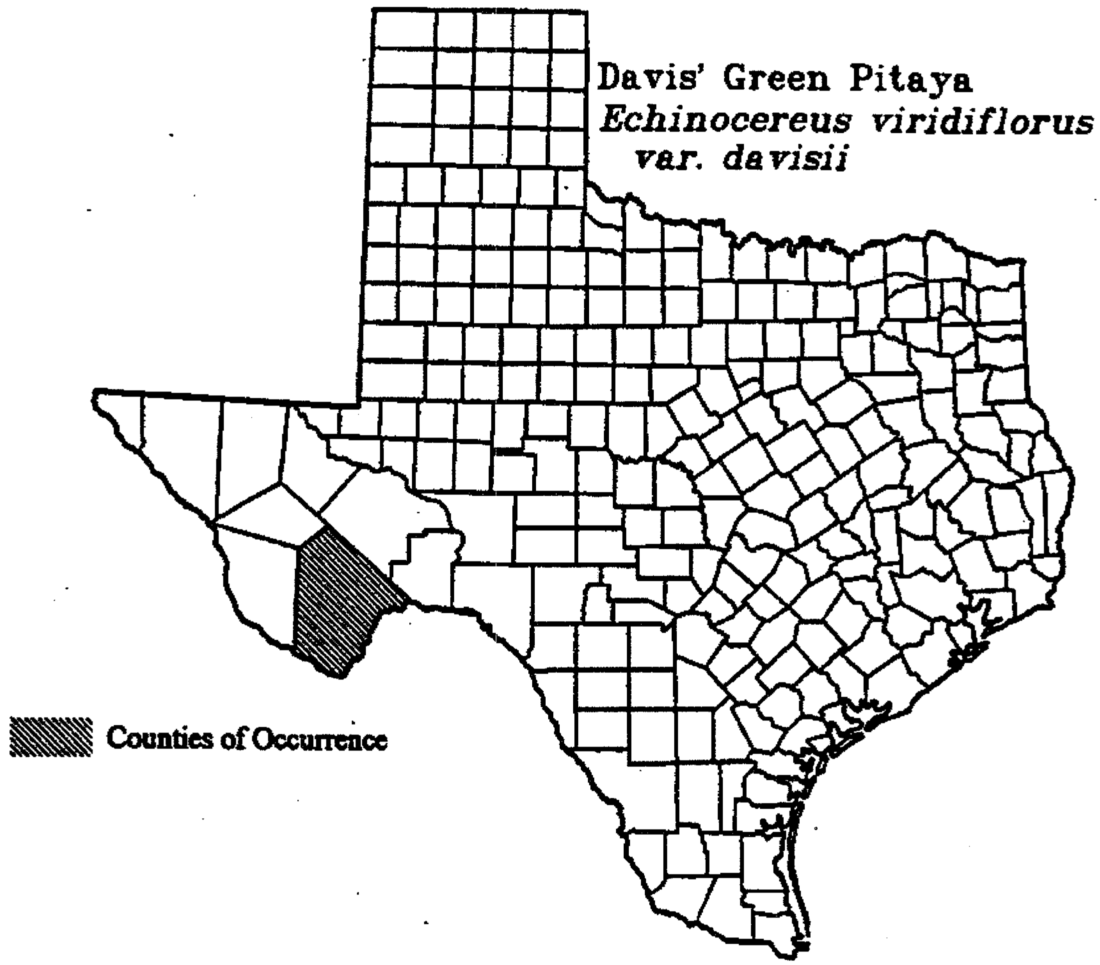
Houghton, A.D. 1930. *Echinocereus davisii* sp. nov. Cact. and Succ. J. 2:466.

Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

Saustrup, A. and M.C. Johnston. 1977. Report on the status of *Echinocereus viridiflorus* var. *davisii*. Rare Plant Study Center, University of Texas, Austin.

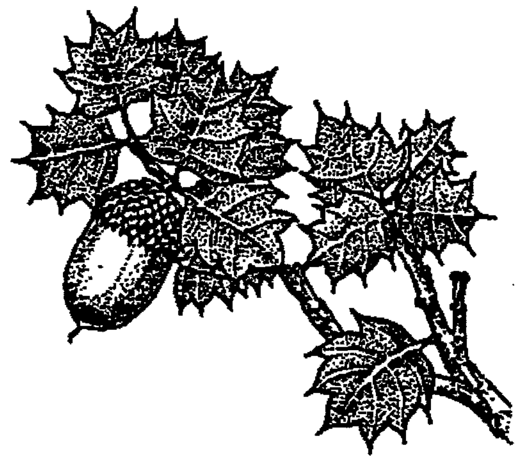
U.S. Fish and Wildlife Service. 1984. Davis' Green Pitaya Recovery Plan. Endangered Species Office, Albuquerque, NM. 34pp.

Weniger, D. 1970. Cacti of the Southwest. University of Texas Press, Austin.


Davis' Green Pitaya
Echinocereus viridiflorus
var. davisii
Counties of Occurrence

STATUS: Threatened (53 FR 32824-August 26, 1988) without critical habitat.

DESCRIPTION: This member of the oak or beech (Fagaceae) family is a dwarf, evergreen, intricately-branched shrub forming coarse thickets 4 feet tall. The waxy gray-green leaves are hairless, very small (up to 5/8 inch long), and egg-shaped to nearly round in general outline, with a heart or ear-shaped base. Leaf margins are wavy and spinose toothed. The leaves are persistent for at least 2 years. Flowers are obscure, with male flowers in small (3/8 inch long) loose clusters, and female flowers very hairy. Acorns are solitary or paired, oval, hairless, brown and about .5 inch broad, with a shallow saucer-shaped cup and more or less wavy margins, maturing in the fall.



HABITAT: Restricted to dry limestone slopes generally below 5,000 feet in elevation, within the desert scrub community. This community includes lechuguilla, whitehorn acacia, mariola, sotol, evergreen sumac, tickbrush, and myrtle croton. Normal rainfall is 8 to 12 inches.

DISTRIBUTION:

Present: In Texas, Presidio County.

Historic: Same as present. Leaves have been found in ancient packrat middens in the Dead Horse Mountains in Big Bend National Park, Brewster County, Texas, indicating the species may have been more widespread in past floras that were more mesic.

THREATS AND REASONS FOR DECLINE: Habitat loss and degradation due to road construction, potential overcollection of acorns (reduction in recruitment), limited distribution, and low population numbers. Predation on acorns by birds and mammals can also hinder recruitment.

OTHER INFORMATION: Fruits are produced annually. Recovery plan approved in 1992.

REFERENCES:

Miller, D.J., and A.M. Powell. 1982. Status Report on *Quercus hinckleyi*. U.S. Fish and Wildlife Service, Endangered Species Office, Albuquerque, NM. 6pp.

Muller, C.H. 1951. The oaks of Texas. Contributions from the Texas Research Foundation. 1:40-41.

Poole, J.M. and D.H. Riskind. 1987. Endangered, Threatened, or Protected Native Plants of Texas. Texas Parks and Wildlife Department, Austin, Texas.

U.S. Fish and Wildlife Service. 1992. Hinckley Oak (*Quercus hinckleyi*) Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 39pp.

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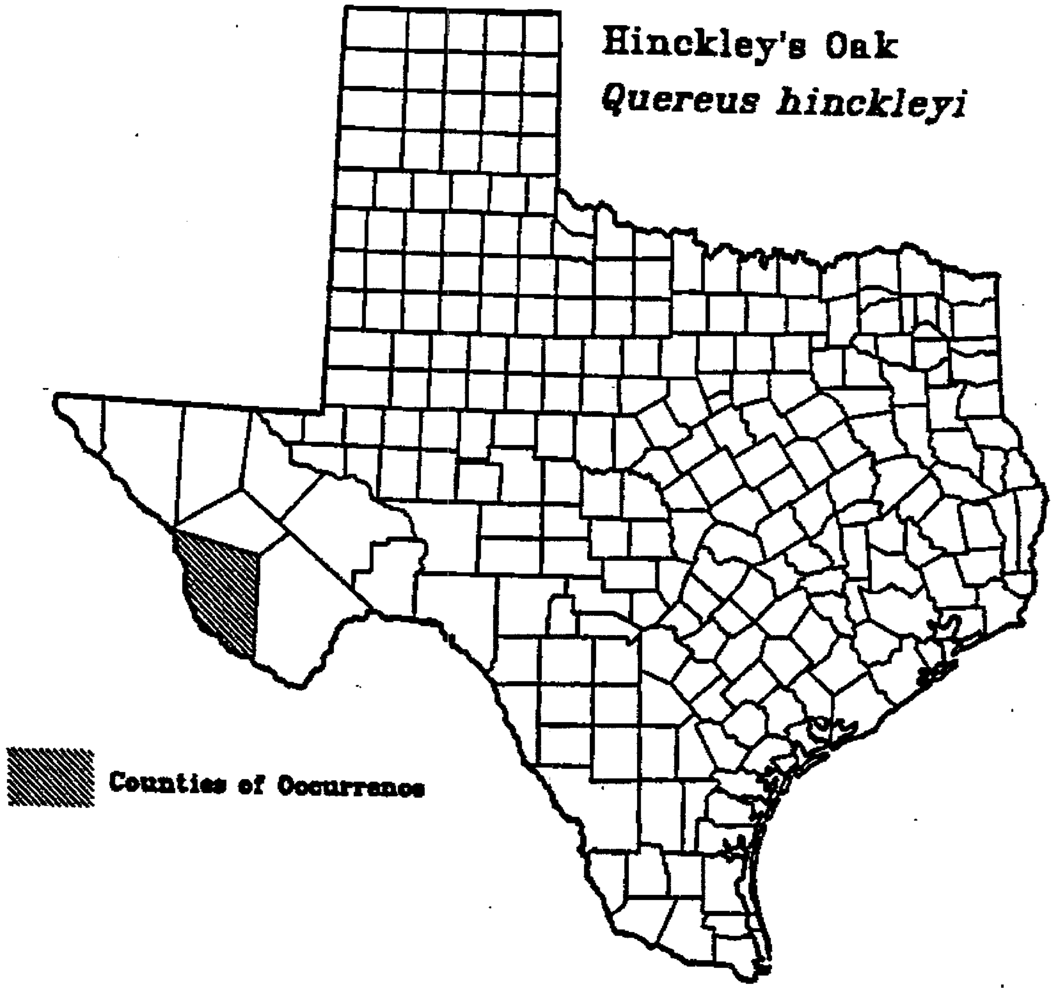


Map only shows Texas range

Desert Spring Fishes

Scientific Name: Comanche Springs Pupfish – *Cyprinodon elegans,* Leon Springs Pupfish – *Cyprinodon bovinus,* Pecos Gambusia – *Gambusia nobilis,* Big Bend Gambusia – *Gambusia gaigei*

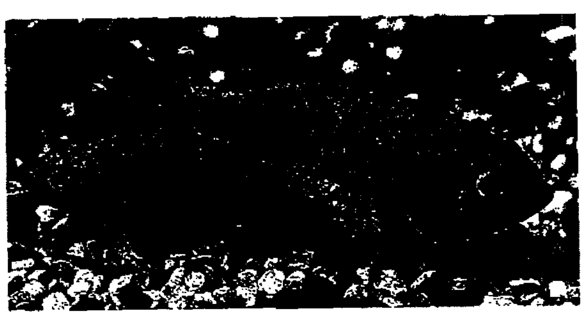
Federal Status: All Endangered; 3/11/67, 8/15/80, 10/13/70, and 3/11/67, respectively •
State Status: All Endangered

Description of Species, Habitats, and Life History

Comanche Springs Pupfish

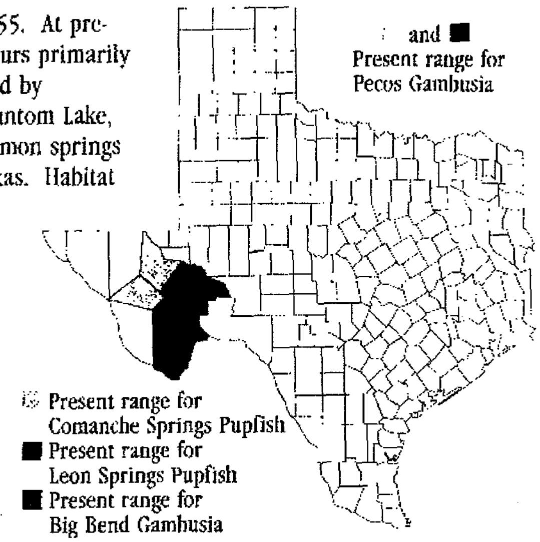
The Comanche Springs Pupfish seldom exceeds 2 inches in total length. It is gray-green above and pale yellow to white below, with clear to light orange fins. The sides are silvery white with blue-black blotches forming a "stripe" along the side (often faint on the male). Males have black speckling on the side and a black edge on the caudal (tail) fin. In contrast to other *Cyprinodon* species, this pupfish has a slender body and lacks vertical bars.

Comanche Springs Pupfish
© Dave Schleser



Leon Springs Pupfish
© TPWD

Historically, this pupfish occurred in two separate spring systems of the Pecos River drainage. One was Comanche Springs, with headwaters (now almost always dry) within the city limits of Ft. Stockton, Texas, and the other was a group of springs near Balmorhea. The pupfish population at Comanche Springs were extirpated (lost) when the springs first went dry in 1955. At present, the species occurs primarily in aquatic habitat fed by springflow from Phantom Lake, Giffin, and San Solomon springs near Balmorhea, Texas. Habitat consists mostly of a system of concrete and earthen irrigation canals. The pupfish are often abundant in earthen ditches and concrete flumes 4 inches or more deep with bottoms covered with debris and vegetation, such as muskgrass (*Chara* spp.). They are rarely found in concrete flumes where water depth is less than 4 inches and/or the bottom is scoured of debris.



The Comanche Springs Pupfish is known only from freshwater to slightly saline habitats. The springs near Balmorhea have low salinities, as did the now dry Comanche Springs. Other species of pupfish in the Pecos River system inhabit more saline waters. Breeding is thought to occur during most months of the year, and spawning (egg-laying) occurs in areas of flowing water as well as in stagnant pools. In irrigation canals, the pupfish prefer shallow areas with low current velocities. Although they feed mostly on the bottom, they also feed at the surface and at other levels in the water column.

Leon Springs Pupfish

The Leon Springs Pupfish is a small (about 2 inches), robust pupfish, with a wider head and body than most pupfish. Breeding males are powdery blue-gray with fins of varying shades of yellow edged with black. Females are grayish-yellow or grayish-brown on top, and lighter below.

The Leon Springs Pupfish was first discovered in 1851 by members of the U.S. and Mexican Boundary Survey. The fish was originally found at Leon Springs, a spring system that once flowed in the Leon Creek drainage about 6 miles west of Fort Stockton in Pecos County. Its historic range probably included all permanent waters within Leon Creek and the associated springs. In 1918, the area where the fish was first collected was inundated by Lake Leon an irrigation and fishing impoundment. By 1938, the Leon Springs Pupfish could no longer be found i the area where it was first discovered. Although Leon Springs once produced a flow of about 20 cfs (cubic feet per second), the springs produced no measurable flow by 1958 due to groundwater pumping in excess of aquifer recharge.

From 1958 until 1965, the Leon Springs Pupfish was thought to be extinct. The fish were rediscovered in 1965, when they were collected from Diamond-Y Spring, located about 10 miles north of Fort Stockton. The fish have since been found in Leon Creek, downstream from Diamond-Y Spring in waters that are quite saline. The recent localities are about 15 miles downstream from where the fish was originally found.

The Leon Springs Pupfish presently occurs within two 3-mile spring-fed segments of Leon Creek and Diamond-Y Spring. Diamond-Y draw is a tributary to Leon Creek. These spring-fed segments are separated by about one mile of usually dry stream bed. The fish prefer slow-flowing stretches of water, with a substrate of mud and aquatic plant roots. They are also abundant in natural spring-fed marshes (cienegas), channels, and pools along this watercourse.

The Leon Springs Pupfish feeds primarily on the bottom, ingesting large amounts of detritus (decomposed organic material) and mud. Food items include diatoms, algae, and small invertebrates. "Pit digging" has been observed, where the fish (mostly males) rest on the bottom of the pool and undulate their bodies to churn up the substrate. This behavior is thought to be associated with locating buried food items.

The Leon Springs Pupfish spawns throughout the year, with females laying up to 10 eggs per day. Spawning occurs on the bottom substrate in territories aggressively defended by individual males. Shallow shelf areas with slow currents, warmer than the deeper channels, are preferred for spawning. This species is known to tolerate an unusually wide range of salinities and temperatures. However, studies suggest that the temperature range required for successful reproduction may be quite narrow. The extended breeding season, wide salinity and temperature tolerances, and broad food habits suggest that the Leon Springs Pupfish is a generalist that does best in simple communities with few competing species.

Pecos Gambusia

The Pecos Gambusia is a small (2 inches long), live-bearing fish with a dark lateral stripe and a metallic gray-blue color. Females have a black area on the abdomen that surrounds the anal fin and anus. The anal fin of males is modified into a gonopodium, a tube-like structure used in fertilization of the female.

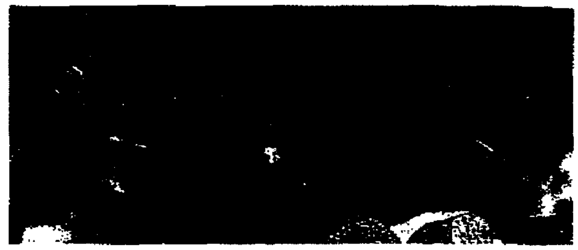
Historically, the Pecos Gambusia was restricted to the Pecos River basin in southeastern New Mexico and western Texas. The species occurred from as far south as Fort Stockton, Texas to as far north as Fort Sumner, New Mexico. The populations of Pecos Gambusia that once existed at Leon Springs and Comanche Springs were lost when these springs went dry during the mid-1950's. Presently in Texas, populations of the Pecos Gambusia occur near Balmorhea in aquatic habitat supported by springflow from Phantom Lake, Giffin, San Solomon, and East Sandia Springs. A substantial population also occurs in Leon Creek and in Diamond-Y Spring outflow north of Fort Stockton. The species also occurs in a limited number of locations in New Mexico.

The Pecos Gambusia occurs abundantly in spring-fed pools, spring runs, and downstream areas having relatively constant temperatures, abundant overhead cover, sedge-covered marshes, and in gypsum sinkholes with no surface flow. It is capable of occupying a variety of habitats if factors such as temperature and salinity are suitable.

The closest relatives of the Pecos Gambusia are found in south Texas and Mexico, so the species has a long history of adaptation to warmer climates. The fish does not occur even in spring-fed waters at higher elevations, presumably because water temperatures are too cold. Maximum temperature is also important in determining suitable habitat. The Pecos Gambusia seems to be less tolerant of higher temperatures than the Western Mosquitofish (*Gambusia affinis*), a major competitor. Studies indicate that the Pecos Gambusia is more abundant in spring-fed waters, but it may also do well in less spring-like waters if there is enough cover from above to buffer temperature changes.

Predation by Green Sunfish (*Lepomis cyanellus*) and Largemouth Bass (*Micropterus salmoides*) can become a major limiting factor in areas where there is no submerged vegetation or shallow water to provide protection from predators. Females produce up to 40 young every 4 to 5 days.

Pecos Gambusia
© Dave Schleser



Big Bend Gambusia
© TPWD

The Pecos Gambusia is an opportunistic feeder. Primarily a surface feeder, major food items include insects, other small invertebrates, and some filamentous algae.

Competition with other Gambusia species is important in determining the relative abundance of the Pecos Gambusia. Studies have shown that, over a period of years, the Western Mosquitofish outcompetes the Pecos Gambusia in isolated pools and downstream waters well removed from spring influence. Salinity seems to be important in determining the influence of an introduced competitor, the Largespring Gambusia (*Gambusia geiseri*). Since the Pecos Gambusia is tolerant of a wide range of salinities, it can outcompete the Largespring Gambusia in the saline waters of Leon Creek, while the Largespring Gambusia seems competitively superior in the freshwaters of the Balmorhea area.

Big Bend Gambusia

The Big Bend Gambusia (*Gambusia gaigei*) is a small, live-bearing fish which reaches a maximum length of about 2 inches. The fish is yellowish in color, with a faint lateral stripe and orange to yellow dorsal and anal fins. Other markings include a bar beneath the eye, and a faint, dark chin bar. Males are smaller than females, and as with other gambusia species, the male's anal fin is modified into a

Diamond-Y Spring
© TPWD

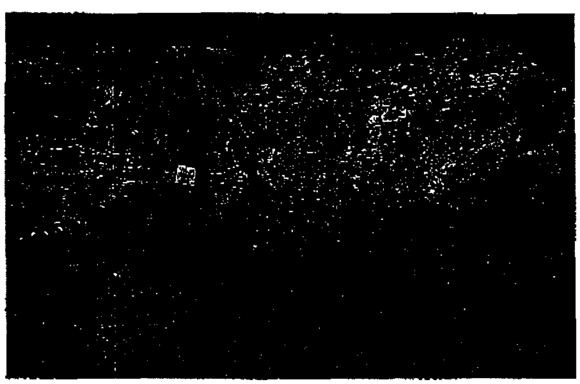
A spring-fed creek in Big Bend Ranch State Park
© Matt Wagner

tube-like gonopodium for fertilizing the female.

The Big Bend Gambusia is known only from spring habitats in the vicinity of Boquillas Crossing and Rio Grande Village in Big Bend National Park. Historically, the fish may have existed in other springs in the vicinity of Rio Grande Village. The population at Boquillas Spring (located about 660 ft. north of Boquillas Crossing) became extinct when spring flow ceased in 1954. The population at the spring located near Rio Grande Village drastically declined between 1954 and 1956, after the spring outflow was altered to provide a fishing pool for the park campground. The Big Bend Gambusia was extirpated from this location by 1960. Two possible factors in the loss of this population include competition with the Western Mosquitofish and predation by the introduced Green Sunfish. All present populations of Big Bend Gambusia consist of descendants of three fish (two males and one female) taken from the declining Rio Grande Village population in 1956. The fish are now being maintained in a refugium pond located in Big Bend National Park. Small populations also exist at the Dexter National Fish Hatchery and Technology Center in New Mexico and at the University of Texas.

The habitats originally occupied by the Big Bend Gambusia were marshes and natural pools, with clear, shallow water fed by warm springs. Dense aquatic vegetation presumably occurred in these areas. Although the present refugium has open water in excess of 3 feet, the Big Bend Gambusia are most abundant among the cattails and muskgrass near the shore.

The Big Bend Gambusia preys on aquatic invertebrates. Little is known concerning factors limiting reproduction in this species, but temperature, daylight hours, and food availability are known to affect reproductive success in related species. Competition with the Western Mosquitofish is thought to be a major factor affecting the survival of the Big Bend Gambusia.



Phantom Lake cienega and spring
© TPWD Andrew Price

Threats and Reasons for Decline

The major threats to the survival of the desert spring fishes are habitat loss from declining springflows and reduced surface waters, competition with introduced species, and loss of genetic integrity due to hybridization with introduced species.

Introductions of fish and mollusk species from inland rivers, the Gulf Coast, and other sources pose a serious threat to these fishes, which have relatively general ecological requirements. Almost any co-occurring species of fish, either indigenous or introduced, would potentially exert some competitive pressure on populations of these fishes. Competition with introduced species that are ecologically similar poses an especially serious threat.

Large artesian springs, such as those in the Balmorhea area, are diminishing in flow. Phantom Lake Spring, near Balmorhea, is particularly vulnerable because it is at a higher elevation and thus would be the first of these larger springs to stop flowing. In many parts of west Texas, more water is being withdrawn from aquifers by pumping than is being replaced by rainfall. In addition, surface waters are being diverted from aquifer recharge zones. This continued mining of aquifers could eventually cause the demise of spring systems throughout west Texas, and with them the extinction of a whole array of unique fishes and aquatic plants and animals. This would also have serious consequences for Texans of the Trans-Pecos, who would lose a valuable water supply.

Recovery Efforts

Research is underway to better understand the life history, habitat requirements, and limiting factors affecting the endangered fishes of west Texas. Continued monitoring of endangered fish populations and habitat is very important.

A cooperative project is currently underway to create a man-made, but biologically functional desert cienega or marsh at Balmorhea State Park. This project, sponsored by Texas Parks and Wildlife Department, the Educational Foundation of America, and the National Fish and Wildlife Foundation, will not only create habitat for the Comanche Springs Pupfish and the Pecos Gambusia, but will also provide spring-fed habitat for a wide variety of native plants and animals. It will also provide an excellent opportunity for school children and park visitors to learn about this unique ecosystem.

A refugium canal within the Balmorhea State Park supports several thousand Comanche Springs Pupfish and Pecos Gambusia. A similar refugium canal, constructed by the Bureau of Reclamation, was recently completed at Phantom Lake Spring. This canal is expected to support abundant, healthy populations of these fishes.

In 1990, The Nature Conservancy of Texas purchased the land encompassing Diamond-Y Spring, and the portion of Leon Creek designated as critical habitat for the Leon Springs Pupfish. In the 1970's, a portion of Leon Creek was renovated, significantly reducing the problems of competition and hybridization. Future scientific management of this habitat will provide protection for the Pecos Gambusia as well as the Leon Springs Pupfish.

A small population of Comanche Springs Pupfish is held at the National Fish Hatchery in Uvalde, Texas. Likewise, small populations of Big Bend Gambusia and Leon Springs Pupfish are being held at the Dexter National Fish Hatchery in New Mexico. These populations provide an opportunity for researchers to obtain specimens for study without affecting wild populations, and provide stocks for reintroductions in the event of the loss of a population.

Where To See The Desert Spring Fishes

The best places to see and learn more about these fishes are Balmorhea State Park and Big Bend National Park. At Balmorhea State Park, visitors can cool off in the world's largest spring-fed swimming pool, where the Comanche Springs pupfish and the Pecos gambusia can sometimes be seen hiding in the shallow, grassy areas of the pool. Also, the refugium canal at Balmorhea State Park is an excellent place to observe these fish. A refugium pond near the Rio Grande Village Campground in Big Bend National Park offers visitors a chance to see the Big Bend gambusia and its habitat.

How You Can Help

Do what you can as an individual to conserve water. Comanche Springs, Leon Springs and others have gone dry because more water is being used than is replaced by rainfall. When springs dry up, a whole host of plant and animal life disappears with them. The competition for water has taken a toll on the wetland plants and animals of west Texas. The existence of these endangered fishes, and other aquatic animals and plants which share their habitat, depends on the continued flow of the springs near Balmorhea, Leon Creek, and in Big Bend. Conservation of these spring ecosystems will result in the continued ability to use water in areas downstream from their habitats.

Since competition with introduced species is a major threat to these endangered fishes, never release fish into natural waters. Serious problems have resulted from people releasing non-native fishes (especially by emptying bait buckets) into streams and springs, or intentionally releasing fish into state waters in an effort to improve fishing.

Be careful with the application of pesticides (insecticides and herbicides) and other agricultural chemicals. Improper use of chemicals can have devastating effects on aquatic systems. Always follow label precautions carefully, including instructions concerning proper disposal of rinse water and containers. Check with the Texas Department of Agriculture (TDA) for information concerning proper use of herbicides and pesticides and licensing requirements.

Due to the toxicity of some pesticides to aquatic life, special management methods are needed for certain chemicals to help prevent possible harm to protected species. Local representatives of wildlife, agriculture, and conservation groups are working with landowners to develop measures that will allow normal agricultural production to coexist with the desert fishes. Farmers, ranchers, and pesticide applicators can contact their local county extension agent, or Coordinator, Endangered Species Pesticide Protection, Texas Department of Agriculture in Austin (512-463-7476) to find out about current recommendations.

A significant portion of the remaining habitat for the Comanche Springs Pupfish and Pecos Gambusia consists of the irrigation canals in the Balmorhea-Toyahvale area of Reeves and Jeff Davis counties. Conservation of

Phantom Lake canal and refugium
© USFWS Ruth Stanford

Biologists using a seine net to sample fish in Leon Creek
© Gary Garrett

these two endangered fishes can be enhanced by ensuring that water quality in the canals supports a functional aquatic community. Farmers can help by careful handling of all fuels, oils, and hydraulic fluids so that canals are not contaminated. Also, maintaining a water depth greater than 1 foot in canals occupied by these fishes is desirable.

West Texas landowners with springs and associated surface water resources can provide additional protection to various populations of rare fishes by limiting habitat disruption, preventing introduction of exotic species, and implementing conservation measures designed to maintain spring flow and water quality in spring-fed creeks and marshes. These precious water resources provide unique areas of plant and animal life. Their protection is vital to the diversity of life which they support.

Finally, you can support the Special Nongame and Endangered Species Conservation Fund by purchasing a stamp, available at the Texas Parks and Wildlife Department headquarters in Austin or at most state parks. Conservation Passports, available from Texas Parks and Wildlife, are valid for one year and allow free access to most State Parks, State Natural Areas, and Wildlife Management Areas. Part of the proceeds from the sale of these items are used to provide information to park visitors concerning endangered species.

For More Information Contact

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Texas Department of Agriculture
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Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

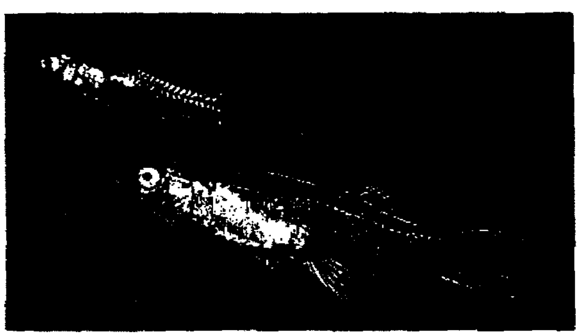
Edwards Aquifer Species

Scientific Name: San Marcos Salamander - *Eurycea nana,* Texas Blind Salamander - *Eurycea rathbuni,* San Marcos Gambusia - *Cambusia georgei,* Foundatin Darter - *Etheostoma fonticola*

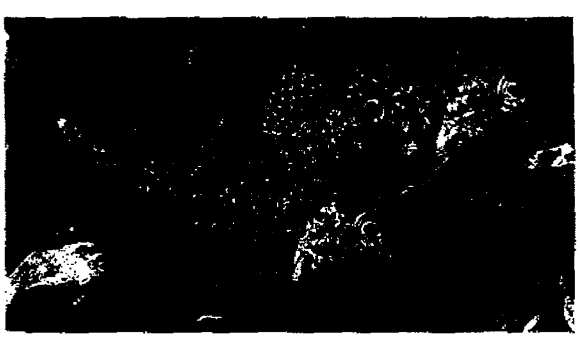
Federal Status: Endangered except for the San Marcos Salamander, which is listed as Threatened • State Status: Endangered except for the San Marcos Salamander, which is listed as Threatened

San Marcos Salamander
© Danal Itrn

Texas Blind Salamander
© Glenn Longley



San Marcos Gambusias
© Bob Edwards



Fountain Darters
© Glenn Longley

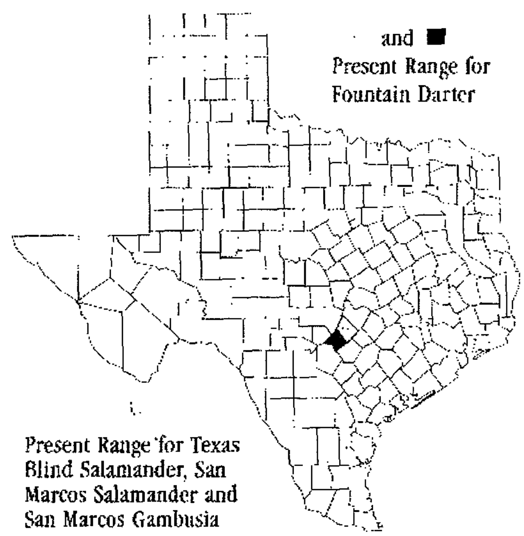
Description of Species, Habitats and Life History

The **San Marcos Salamander** is small and slender, with a total length of about 2.5 inches. It is uniformly light brown to golden brown, with small yellow flecks along each side of the back. The underside of its body is yellowish-white. A member of the brook salamander group, the San Marcos Salamander has external gills, which are retained throughout life. It has relatively short slender legs, with four toes on the fore feet and five on the hind feet. It has a slender tail with a well developed dorsal or top fin.

The San Marcos Salamander occurs only in Spring Lake and an adjacent downstream portion of the upper San Marcos River. They are often found in spring areas with a substrate of sand and gravel interspersed with large limestone boulders. These boulders in shallow water support a lush growth of aquatic moss. Interspersed with the moss and covering the shallow sandy substrate are thick mats of coarse filamentous blue-green algae. The dark reddish-brown color of this algae almost perfectly matches the dark dorsal color of the San Marcos salamander. Vegetative cover is important for protection and for providing habitat for living organisms that serve as food for the salamander. This species does not inhabit areas with a sandy bottom devoid of vegetation, nor do they occur where the bottom is muddy, whether or not vegetation is present. Clean, clear, flowing water of constant temperature is required for suitable habitat.

San Marcos Salamanders feed on amphipods (tiny aquatic crustaceans), aquatic insects, and small aquatic snails. Breeding is thought to occur throughout the year with a possible peak in May and June.

The **Texas Blind Salamander** occurs only in the subterranean waters of the Edwards Aquifer near San Marcos, Texas. Because it is adapted to living in a subterranean environment, it lacks eyes and has little skin pigment. It is all white, with blood-red external gills and toothpick-like legs. The head and snout of this salamander are strongly flattened, with two small



black dots representing vestigial eyes beneath the skin. Its total length is about 5 inches.

This salamander is entirely aquatic, and lives in the water-filled caverns in the San Marcos Pool of the Edwards Aquifer. It requires clean water of relatively constant temperature.

The Texas Blind Salamander feeds on a variety of small subterranean aquatic organisms, including tiny snails, amphipods, and shrimp. When feeding, the salamanders probe the bottom using lateral movements of the head. When anything living is encountered, the mouth quickly opens and the food item is immediately sucked into the mouth. Numerous sharp teeth prevent the prey from escaping. It is thought that sensitivity to water vibrations also helps these salamanders locate food.

Although courtship and reproductive behavior have been observed and recorded for captive specimens, little information exists regarding reproduction of the Texas Blind Salamander in its natural habitat. Females with eggs and juveniles have been observed throughout the year, so it is thought that reproduction occurs year-round.

One of the rarest animals of the San Marcos River, and one which may already be extinct, is the **San Marcos Gambusia**. Last collected in the wild in 1983, this fish is a member of a genus having more than 30 species of livebearing freshwater fishes. It is a small fish, about 1 inch in length, known only from the San Marcos River. This species is plainly marked and similar in appearance to the mosquitofish (*Gambusia affinis*). It has a prominant dark stripe along the upper edges of the dorsal fin. The unpaired fins tend to be yellow or yellowish-orange. A bluish sheen is evident near the head, especially in more darkly pigmented adult females. The anal fin of *Gambusia* males is modified into a tube-like structure called a gonopodium. The gonopodium is used to transfer sperm from the male to the female.

The San Marcos Gambusia prefers shallow, quiet waters adjacent to sections of flowing water. Constant water temperature is also very important. This fish prefers a muddy, but not silted, bottom. Partial shade from bridges or overhanging vegetation also seems to be an important habitat factor.

There is little information on the food habits or reproduction of this species. It is thought that insect larvae and other invertebrates comprise most of the diet.

The **Fountain Darter** is a small fish, usually about 1-2 inches in length, found only in the San Marcos and Comal River headwaters. It is reddish-brown with fine specks in the dorsal region. A series of horizontal stitch-like dark lines occur along the middle of the sides, forming an interrupted lateral streak. There are three small dark spots on the base of the tail, and one on the opercle (flap covering the gills). Dark bars appear in front of, below, and behind the eye. The lower half of the dorsal fin is black, above this is a broad red band, and above this the fin is edged in black.

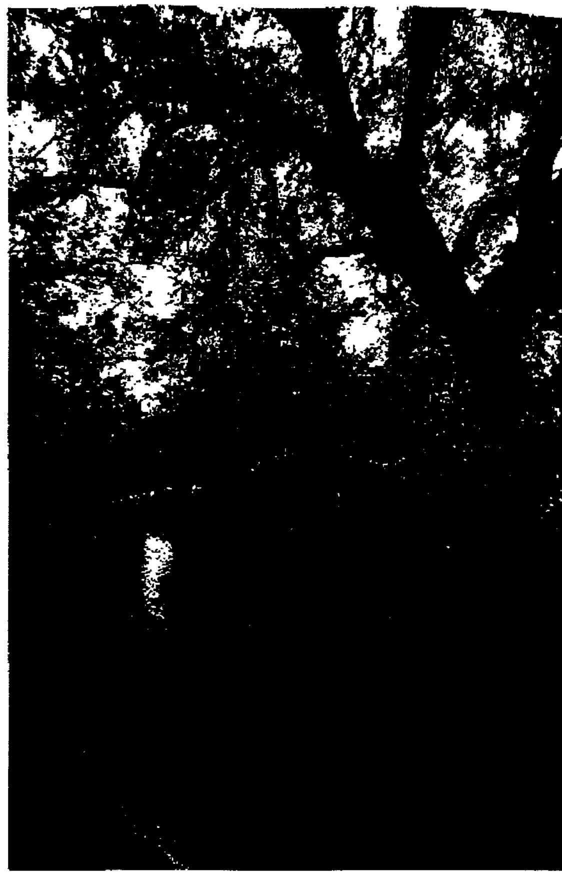
The Fountain Darter prefers vegetated stream-floor habitats with a constant water temperature. The fish are most often found in mats of filamentous green algae and other aquatic plants. They are occasionally found in areas lacking vegetation. Young Fountain Darters are found in heavily vegetated, backwater areas of the San Marcos and Comal Rivers where there are low water velocities. Adults occur in all suitable habitats, including riffles.

Fountain Darters feed on copepods (tiny aquatic crustaceans) and mayfly larvae. They feed primarily during the day, and show selective feeding behavior. Observations suggest that darters feed on small moving aquatic animals, while ignoring immobile ones.

Threats and Reasons for Decline

Both the San Marcos and Comal Rivers originate from springs fed by the Edwards Aquifer. Because the flow of these springs is intimately tied to water usage over the entire Edwards Aquifer region, human population growth and increased use of groundwater resources throughout the region are likely to decrease spring flow. Relatively constant water temperatures and flows are requirements for these listed species. The danger of reduced spring flow is the most serious threat to the continued existence of the San Marcos and Comal Rivers and their endemic plants and animals.

The effects of periodic drought coupled with increased groundwater use is a serious threat. For example, a severe drought from 1950-1956 greatly reduced the aquifer level and spring discharges.



San Marcos River

San Marcos River

During 1956, Comal Springs ceased to flow for five months. Less severe droughts in 1984 and 1990 resulted in minimum daily flows at Comal Springs of 24 cfs (cubic feet per second) and 46 cfs, respectively, compared to the mean spring flow discharge (1933-1990) of 293 cfs.

Other threats associated with increased urbanization include increased flooding and erosion, pollution, siltation, and storm water runoff. All of these factors can adversely affect the listed species and their habitats. Also, exotic species pose a threat because they may destroy aquatic vegetation, prey on these endangered animals, or compete with them for resources.

Urban development along the San Marcos River
© TPWD Leroy Williamson

River pollution
© TPWD Bill Reaves

Sampling Fountain Darters in the Comal River
© TPWD

Recovery Efforts

Monitoring existing populations and habitats is important in understanding the factors affecting the listed species and their habitats. Basic biological research addressing habitat requirements and aspects of life history, such as food habits, reproduction, diseases and parasites, and predation and competition, is currently underway to better understand the survival needs of each species.

The U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department and other cooperators are engaged in a multi-year study to assess spring flow and stream flow needs of the threatened and endangered species of the Comal and San Marcos springs ecosystems. The U.S. Fish and Wildlife Service is also working with the City of New Braunfels to insure that the management of city properties such as parks is compatible with the conservation of the Comal Springs/River Ecosystem and the endangered species it supports.

Finally, providing information to the public regarding protection of the San Marcos and Comal River ecosystems, and the unique plant and animal species dependent on them, also is vital to the recovery of the listed species.

How You Can Help

Support conservation efforts to protect the San Marcos and Comal River ecosystems and their associated native species. Conservation of these spring ecosystems will result in the continued ability to use water in areas downstream from their habitats. Stay informed about conservation issues relating to the quality and quantity of groundwater and surface water in the Edwards Aquifer region. Do your part to conserve water, prevent pollution and introduction of exotic species, and preserve streambed vegetation so that Texans can continue to enjoy the clean, flowing waters and diversity of plant and animal life of the San Marcos and Comal River ecosystems.

For More Information Contact

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or
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Ecological Services Field Office
10711 Burnet Road, Suite 200
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(512) 490-0057

Management guidelines are available from the Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service for landowners and managers wishing to protect the Edwards Aquifer waters and their associated endemic species.

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Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

Mexican Spotted Owl

Scientific Name: *Strix occidentalis lucida*

Federal Status: Threatened, 3/16/93 • State Status: Threatened

Description

The Mexican Spotted Owl is a medium-sized owl, reaching a length of nearly 17 inches. It has dark eyes and white spotting on the head, back, and underparts. It is somewhat similar to the Barred Owl, but with spots on the breast rather than barring and streaking. The Mexican Spotted Owl is one of three spotted owl subspecies occurring in North America. It is distinguished from the California and Northern Spotted Owls primarily by geographic distribution and plumage. Although the background coloration of the Mexican Spotted Owl is darker brown than the other two subspecies, its spots are larger, more numerous, and whiter in color, giving it a lighter color overall.

Mexican Spotted Owl
© F. R. Gehlbach

The owl's call is usually four-noted and rarely three-noted. The owl also utters what has been described as a series of 3 or 4 hesitant, doglike barks and cries. Calls are most frequently heard throughout the breeding season (February-August). Like most other owls, Mexican Spotted Owls are usually seen singly or in paris.

Distribution and Habitat

The Mexican Spotted Owl has the largest geographic range of the three spotted owl subspecies. Its range extends from the southern Rocky Mountains in Colorado and southern Utah, southward through Arizona, New Mexico and Trans-Pecos, Texas, to the Sierra Madre Occidental and Oriental mountains in Mexico. Although there are no estimates of the owl's historic population size, its historic range is thought to be similar to its present distribution. The 1990 population estimate of Mexican Spotted Owls in the southwestern United States was 806 pairs and 548 singles for a total of about 2,160 birds. An estimated 91% of Mexican Spotted Owls known to exist in the southwest at the end of 1990 occurred on national forests; the other 9% occurred on Indian reservations (4%), national parks (4%), BLM lands (1%), and private lands (less than 1%).

In Texas, the Mexican Spotted Owl occurs in the Guadalupe Mountains near the New Mexico border. An owl was first observed in these mountains in 1901. One to about 10 owls regularly occupy this habitat. It is possible that Mexican Spotted Owls exist in other mountain ranges of west Texas where suitable habitat occurs.

Characteristics of Mexican Spotted Owl habitat include a canopy cover of mature trees. The owls prefer areas with a multilayered canopy resulting from trees of different ages. Other habitat characteristics, typical of old-growth stands, include downed logs and snags. Much of the owl's habitat is characterized by steep slopes and canyons with rocky cliffs.

The vegetation in Mexican Spotted Owl habitat can be described as mixed-conifer forests with overstory trees such as white pine, Douglas fir, and ponderosa pine. Understory trees and shrubs include oaks, junipers, and maples. Mountain streams along canyon bottoms, that support vegetation such as box elder, cottonwood, and walnut also provide important habitat.

Habitat use by Mexican Spotted Owls appears to vary according to activity. The owls roost and nest primarily in closed canopy forests with large trees, snags and many big logs, or in cliff crevaces adjacent to such vegetation. In a recent study in northern Arizona, all the owls monitored roosted primarily in virgin mixed-conifer forests. Foraging owls appear to use a wider variety of habitats, including mature mixed-conifer and ponderosa pine forests. Mature forests likely provide abundant habitat for foraging, nesting, and breeding activities of the owls, including ample perches and numerous downed logs. These habitat features, present in many foraging areas, may be important in providing homes and protective cover for the small mammals on which the owls prey.

Mexican Spotted Owls nest on stick platforms made by other birds (like hawks or ravens), in tree cavities, and, especially in Texas, on cliff ledges. Nest trees selected by owls are of moderate to large diameter and height for their species. Nest trees in Arizona are often located on moderate to steep slopes at elevations ranging from 6,000 to 8,000 feet. Most nest trees occur on northern or eastern facing slopes, indicating a preference for the cooler part of the habitat. Cliff nests in Texas are at 5,000 to 7,000 feet elevation in deep, cool canyons.

Life History

Limited information is available on the reproductive biology of the Mexican Spotted Owl. Generally, spotted owls lay a clutch of 1 to 3 white, unmarked eggs during March and April. The female incubates the eggs for about 30 days, and most eggs hatch by the end of May. Broods generally contain 1 or 2 owlets, although nests with 3 young have been found. Males provide food for the female and young until the owlets are about 2 weeks old. After this, the females assists in capturing food for the young. Reproductive success of Mexican Spotted Owls is widely variable between years. Variation in rainfall and thus prey species abundance are factors affecting reproductive success. In some years when food is scarce, the birds do not nest.

Female owls roost at the nest until 3 to 6 days before the owlets leave the nest. Most owlets fledge (leave the nest) in June, about 35 days after hatching. Owlets are unable to fly when they first leave the nest, but become increasingly better at flight throughout the summer. By early October, the young are fully independent.

Mexican Spotted Owls in northern Arizona were found to occupy areas (home ranges) varying in size from 702 to 2,386 acres. The combined home ranges occupied by pairs averaged 2,092 acres. Within this large home range, the owls appeared to have core areas or centers of activity that were consistently occupied. Core areas of individuals averaged 336 acres, and core areas for pairs averaged 398 acres. The owls tended to favor areas with steep slopes. Most owls remained within their summer home range throughout the year.

Mexican Spotted Owls eat a variety of mammals, birds, reptiles, and insects, although rodents make up the bulk of the diet. The owls hunt at night, capturing primarily rats (especially woodrats), mice, and pocket gophers. They hunt mainly by moving from tree to tree, pausing for a few seconds to minutes, watching and listening for prey. Spotted owls launch their attack at relatively short distances from their prey, so multi-layered forests with many potential perches are advantageous to owls hunting prey.

Goshawks and other hawks, along with Golden Eagles and Great-horned Owls, are potential predators of Mexican Spotted Owls. Although Great-horned Owls occur most often in flatter, more open habitat, there is some overlap between the two species. Young owls are particularly vulnerable as nestlings and after fledging.

Threats and Reasons for Decline

As an inhabitant of closed canopy, uneven-aged mature forests and canyons, the Mexican Spotted Owl is threatened by destruction and modification of its habitat. Harvest of old-growth timber stands, even-aged timber harvest systems, wildfires, and increased predation associated with habitat fragmentation are reasons for the owl's decline.

In Texas, sightings have occurred in or near Guadalupe Mountains National Park, and there is at least some evidence that the owls could exist in other mountainous areas of west Texas. With increased awareness of habitat requirements, public and private land managers in Texas can help to insure the continued existence of the Mexican Spotted Owl.

Recovery Efforts

Research is underway to answer questions concerning habitat use, home range, reproductive biology, and population dynamics of the Mexican Spotted Owl. Population monitoring will continue to provide information concerning the owl's status. Research is needed to better understand the structural features needed by Mexican Spotted Owls and how these features might be retained in managed forest stands. Efforts to inform land managers and the public about the habitat requirements and biology of the Mexican Spotted Owl are an important part of the recovery process.

How You Can Help

Landowners in the Guadalupe Mountains and other mountain ranges of west Texas can help by protecting old-growth forest habitat, particularly areas associated with steep slopes and moist, cool canyons. Landowners and park visitors are encouraged to report sightings of Mexican Spotted Owls to the Texas Parks and Wildlife Department, U.S. Fish and Wildlife Service, or the National Park Service. Be sure to record notes concerning appearance, behavior, habitat being used, and location. Take a photograph if possible, or record the owl's call. Observations should be made without disturbing the birds.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Part of the proceeds from the sale of these items are used for endangered species habitat management and public information. Conservation organizations also welcome your participation and support. Finally, you can encourage and support efforts to conserve old-growth forests of the southwestern United States.

For More Information Contact

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U.S. Fish and Wildlife Service
Ecological Services Field Office
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Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

Northern Aplomado Falcon

Scientific Name: *Falco femoralis septentrionalis*

Federal Status: Endangered, 2/26/86 • State Status: Endangered

Description

The Aplomado Falcon is a medium-sized falcon, smaller than the Peregrine and Prairie Falcon, but larger than the Kestrel and Merlin. Its total length is about 15 to 18 inches, with a wingspan of about 32 to 36 inches. The name aplomado means "steel gray" in Spanish and describes the color of the adult's back and outer wings. Distinguishing fieldmarks include a dark "cummerbund" or belly band often marked with narrow, horizontal white bars; a long blackish tail with 6 to 8 white crossbars; and a distinctive facial pattern. The upper breast and throat are white or buff-colored, and sometimes covered with scattered thin dark streaks. The abdomen, thighs and undertail are a cinnamon color, and the fleshy eye ring and legs are brilliant yellow. Compared to adult females, adult males are noticeably smaller, with more pronounced white barring on the cummerbund and less streaking on the upper breast.

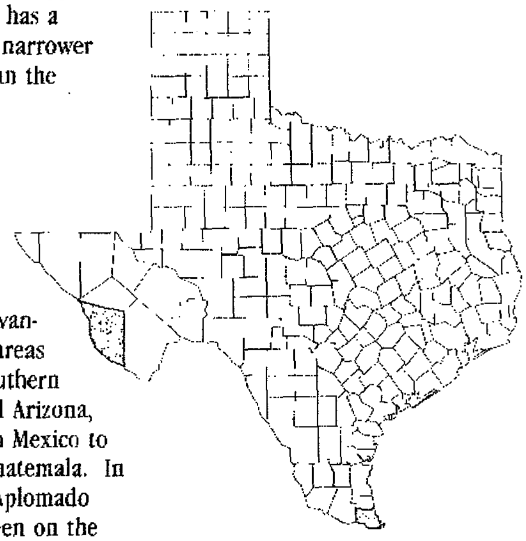
Aplomado Falcon
© TPWD Glen Mills

Juveniles differ from adults in that the upper breast and throat is a deep cinnamon color rather than white or buff-colored. Also, broad, dark streaks (as opposed to thin streaks in some adults) cover most of the upper breast. Finally, the legs and eye ring are bluish-green, not yellow.

In flight, the Aplomado Falcon can be distinguished from larger falcons (Prairie and Peregrine) and the Merlin by its longer tail and wings that are relatively narrow near the body. The Aplomado's flight profile is most similar to the American Kestrel or Mississippi Kite, but the Aplomado has a slightly longer tail and narrower wings, and is larger than the kestrel.

Distribution and Habitat

The northern subspecies of the Aplomado Falcon once inhabited grassland, savannah, and desert scrub areas throughout parts of southern Texas, New Mexico, and Arizona, and southward through Mexico to the western coast of Guatemala. In the United States, the Aplomado Falcon was regularly seen on the coastal prairies of south Texas. Historical records also exist for the river valleys, desert marshes, and grasslands of Trans-Pecos Texas, southern New Mexico and southeastern Arizona.



Aplomado Falcon habitat consists of open grassland with scattered trees or shrubs. In Arizona, New Mexico, Trans-Pecos Texas, and central plateau of Mexico, Aplomados inhabit semi-desert grassland with scattered mesquite and yucca. In the past, Aplomados were most abundant in the coastal grasslands of south Texas and the savannah grasslands of eastern Mexico. These birds also inhabited coastal dunes and tidal flats, and margins of inland marshes and riparian woodlands. In Mexico, Aplomados nest in savannah grasslands with scattered tropical live oak, lowland pine, or acacia trees, dry tropical deciduous woodlands, cutover rainforest, and, at higher elevations, stands of tree yuccas and open pine-oak woodlands. Occupied habitat has been described as having tree densities of about 19 trees per 100 acres, an average distance between trees of about 100 feet, and average tree height of 30 feet.

Scientists believe that before the turn of the century, Aplomado Falcons were quite common in the grasslands of southern and western Texas, New Mexico, and Arizona. Several pioneer naturalists wrote that they frequently saw this species in their travels (Merrill, 1878; Bendire, 1892; Smith, 1910). They described the Aplomado as "quite common," "fairly common," or "frequently encountered."

By the 1930's, the Aplomado Falcon had become very rare in the United States. The last nesting pair reported in Texas was in Brooks County in 1941, and the last confirmed nest within the United States was in New Mexico in 1952. On the King Ranch in south Texas in 1949, Val Lehmann collected the last Aplomado Falcon specimen from the United States. He continued to see Aplomados in this area until the 1950's. Between 1950 and 1960, several Aplomados may have been observed in Big Bend National Park and on the southern Texas coast. More recent sightings include one on the Texas coast in 1963, and one in El Paso County in 1968. During the 1970's, Aplomados were occasionally reported from southern and western Texas, southwestern New Mexico, and southeastern Arizona.

Because of population declines during the the early 1900's, the Aplomado Falcon is exceedingly rare in the United States today. Between 1986 and 1993, The Peregrine Fund released 46 Aplomado Falcons on the Laguna Atascosa National Wildlife Refuge on the southern Texas Gulf Coast. Scattered sightings have been recorded since that time on the refuge and in other parts of south Texas. The Refuge and some private land on its borders are the only areas in Texas where Aplomado Falcons are regularly sighted.

Within the last two years, authenticated sightings have been made at the White Sands Missile Range in New Mexico and in the Trans-Pecos near Marfa, Texas. Also, nesting birds have been discovered in northern Mexico. These recent sightings, coupled with the fact that scattered unconfirmed sightings have been reported since the 1950's from the grasslands surrounding the Davis Mountains of Texas and the Guadalupe Mountains of New Mexico, are cause for hope that Aplomados may be slowly recolonizing their former range in the United States west of the Pecos River. In Mexico, Aplomado Falcons are known to nest in the states of Chihuahua, Tamaulipas, Veracruz, Chiapas, Campeche, San Luis Potosi, and Tabasco.

Life History

Most often seen in pairs, Aplomado Falcons hunt together, often soar together, perch near one another, and even feed together outside the breeding season. During the spring of their second year, pair bonds are formed. Courtship behavior includes display soaring, feeding, and nest displays. Like other falcons, Aplomados do not construct their own nests. Instead, they use the stick platforms built by other birds. In Mexico and the United States, nests of the Chihuahuan Raven, Swainson's Hawk, Crested Caracara, Roadside Hawk, Brown Jay, White-tailed Kite, Gray Hawk, and Lesser Black Hawk may be used by Aplomado Falcons. Stick nests used by Aplomados generally average about 1 to 3 feet in diameter.

Aplomado Falcons usually lay 2 to 3 eggs. Although both parents share incubation, the female spends more time at the nest than the male. Sometimes the parent incubating eggs leaves the nest temporarily to assist its partner with hunting or nest defense activities. Aplomados actively defend the area surrounding the nest by attacking any intruder perceived to be a threat.

The eggs hatch in about 32 days, and the nestlings are covered with light gray down. Newly hatched nestlings are closely brooded by the female, and this may be the only time of year when mated males typically hunt alone. The young are fed primarily by the female, although sometimes the male assists with the feeding. Nestlings fledge at 32 to 40 days, but parents continue to feed them for about another 4 weeks. In eastern Mexico, Aplomado Falcons nest during the dry season (January-June). They nest only once per year. Although Aplomados have not nested in the United States since the early 1950's, records from the early part of this century show that most nesting occurred in April and May.

As the young grow, the hunting activity of adults increases. The young are fed 6 or more times each day, which represents perhaps 25 to 30 hunting attempts. Aplomado Falcons hunt primarily birds, but also eat insects, small snakes, lizards, and rodents. Favorite avian prey includes doves, cuckoos, quail, woodpeckers, blackbirds, flycatchers, thrushes, meadowlarks, and sparrows. Aplomados typically chase small birds and insects during horizontal flights initiated from

Aplomado Falcon chicks
© Fred Hedrickson

Male falcon providing food
© Noel Synder

a perch. They are extremely fast in level flight, and are capable of outflying species such as Mourning Doves, Rock Doves, and Killdeer. Aplomados readily continue the chase on foot when prey animals try to escape by entering crowns of trees, small shrubs, or dense grass. Agile on foot, Aplomados often run down ground birds. Insects are generally captured and often eaten during flight. Larger insects and birds are taken to favorite perches to be plucked and consumed. Food not immediately eaten is stored in caches placed in the crooks of branches, in small shrubs, or in clumps of grass. Cache sites, with or without stored food, are actively defended by the falcons from other predators.

When hunting small birds, the male and female often work together. In general, the male ranges more widely from the nest site to locate food. When he finds suitable prey within sight of the female, he calls her to help drive the prey from cover or join in the pursuit as it takes flight. For example, a typical hunt starts when the male spots prey perched in trees or feeding on the ground. He flies slowly to a position overhead and

Aplomado Falcon habitat in South Texas
© USFWS Marie Fernandez

Adult Aplomado Falcon
© D. P. Keddy-Hector

hovers, while chipping repeatedly. The female then glides directly to the male, lands, and chases the bird on foot until she captures it or it takes flight, at which point she joins her mate in pursuit. Most hunting activity occurs within view of the nest when nestlings are present, although males do occasionally hunt at more distant locations, particularly after several unsuccessful hunting attempts close to the nest.

Little is known regarding the seasonal movements of Aplomado Falcons. There is no evidence that these falcons are migratory, either in the United States or Mexico, and mated pairs remain on their territories year-round.

Threats and Reasons for Decline

Although it is somewhat of a mystery why the Aplomado Falcon is so rare in the United States today, habitat loss and the bird's sensitivity to pesticide contamination are likely reasons. Loss of habitat probably caused its disappearance from formerly occupied areas, while pesticide contamination may have kept falcon numbers low enough so they did not recolonize portions of their former range.

Brush encroachment resulting from uncontrolled livestock grazing and fire suppression has altered much of the grassland habitat once inhabited by Aplomado Falcons in Texas. Continuous heavy grazing pressure, which reduces plant diversity and leads to declines in range condition and brush invasion, affects Aplomado Falcons by reducing habitat for prey species. Aplomado Falcons tend to abandon nesting territories where grass ground cover gives way to brush.

Well-planned brush management and periodic prescribed burning are management practices that can be used to maintain open rangelands with scattered mottes of brush and trees, which is preferred habitat for Aplomado Falcons. Management for these falcons is therefore very compatible with practices that maintain and restore healthy rangelands. In fact, the presence of Aplomado Falcons often reflects good rangeland management. Well-managed pastures with a diversity of perennial plants and substantial ground cover are likely areas for these falcons. Grazing management (moderate stocking, rotational grazing), selective brush control, range seeding, and prescribed fire can be used to maintain diverse and productive rangelands able to support abundant prey for Aplomado Falcons.

Conversion of rangeland to cropland has also contributed to habitat loss. Since the early 1900's, much of the Lower Rio Grande Valley and gulf coastal plain of Texas and Mexico have been converted to citrus, sorghum, beans and cotton. River floodplains of the middle Rio Grande, the Pecos and the Gila in New Mexico and Arizona have also been altered with some conversion to farmland. Degradation of stream habitats and the loss of seasonally wet playas throughout the desert southwest probably also contributed to the Aplomado's decline because of their importance in supporting avian prey.

Pesticide contamination may have further reduced habitat quality for the Aplomados remaining in the United States at the beginning of the DDT era (1947-1972). As with other birds of prey at the top of the food chain, such as the Peregrine Falcon and Bald Eagle, the Aplomado Falcon is sensitive to pesticide-induced reproductive problems. Studies have shown that falcons affected by chemicals such as DDT failed to lay eggs, and many produced thin eggshells that broke during incubation. Eggs that did not break were often rotten or contained dead embryos, and the young that hatched often died. One study in eastern Mexico showed that Aplomado eggs collected after 1947 were 25% thinner than eggs collected prior to the introduction of DDT. Since DDT and related pesticides were banned in the United States in 1972, species such as the Bald Eagle, Peregrine Falcon, and Eastern Brown Pelican have steadily increased in numbers. Although levels have declined in the United States, pesticide contamination remains a concern, particularly in foreign countries where the use of DDT is still legal. Residual pesticide levels are still relatively high in parts of south Texas. Periodic monitoring of pesticide levels is needed, particularly in grassland habitats that are relatively close to farming areas. Desert grasslands remote from agriculture are unlikely to have residual pesticide contamination.

Recovery Efforts

In 1984, with leadership from The Peregrine Fund, Inc., a non-profit organization dedicated to preventing the extinction of endangered and threatened birds of prey through research and restoration programs, and the U.S. Fish and Wildlife Service, efforts began to re-establish the Northern Aplomado Falcon as a breeding species in the United States. The Aplomado Falcon Restoration Project is based on techniques developed by The Peregrine Fund for the successful restoration of the Peregrine Falcon (*Falco peregrinus*) in the contiguous United States. This involves captive breeding and monitored releases of young into suitable habitat.

The first captive breeding of the Aplomado Falcon was accomplished at the Chihuahuan Desert

Research Institute in 1982. Captive breeding experiments were conducted on the Aplomado Falcon at the Santa Cruz Predatory Bird Research Group facility and World Center for Birds of Prey between 1984 and 1990. These efforts produced 36 falcons and yielded important breeding and management information. Experimental releases of captive-bred Aplomados were conducted at the Laguna Atascosa National Wildlife Refuge (Cameron County) from 1986 through 1989, producing important information on release techniques. During 1991 and 1992, emphasis was placed on enhancing reproduction of captive falcons and establishing a captive population capable of producing at least 50 young each year. Beginning in 1993, program emphasis shifted to production and release of maximum numbers of falcons and monitoring of certain representative individuals.

Reintroduction efforts have already started to pay off. In May, 1995, an Aplomado hatchling was discovered in a nest atop a 65-foot utility pole on a remote tract owned by the Port of Brownsville. By June, this history-making Aplomado Falcon had made its first flight and was learning to hunt. The young bird is the first known Aplomado Falcon to be hatched in the American wild in 43 years.

The success of the Aplomado Falcon Restoration Project depends on cooperation between government, private organizations, and landowners. The amount of public land in Texas is insufficient to maintain a self-sustaining population of Aplomado Falcons, so the cooperation of private landowners will be critical. Landowners with large acreages of rangeland in south and southwest Texas have the opportunity to play a vital role in the recovery of this beautiful falcon. Those interested in cooperating in the restoration effort should contact Texas Parks and Wildlife Department or the U.S. Fish and Wildlife Service.

Biologists from various agencies and groups are increasing their efforts to survey and monitor breeding Aplomados in northern Mexico. It is hoped that these populations will continue to grow and that birds will gradually move north into the United States.

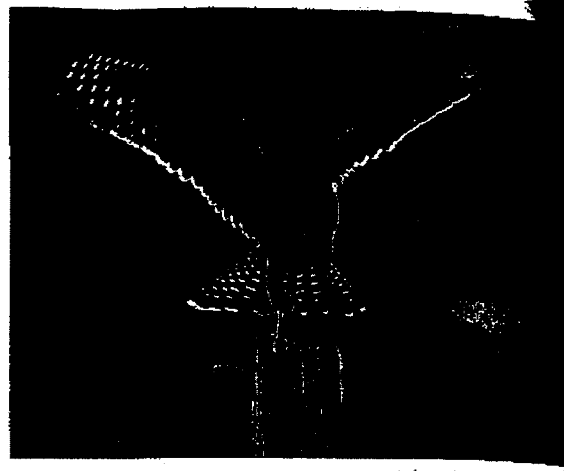
Where To See Aplomado Falcons

The only place in the United States where Aplomado Falcons can be consistently seen is the vicinity of the Peregrine Fund's southern Texas reintroduction project at the Laguna Atascosa National Wildlife Refuge near Rio Hondo, Texas. Recent sightings near the Davis Mountains of Texas are cause for hope that Aplomados from northern Mexico are slowly recolonizing southwestern Texas.

To search for Aplomado Falcons in Texas, the best strategy is to search grassland and savannah habitats in the southern and southwestern portions of the state. Areas with an abundance of small birds and stick nests built by ravens and other raptors should receive special attention. During March through June, all large stick nests should be examined from a distance for signs of adults incubating eggs or brooding chicks. Females often sit quietly on the nest, and the long tail can sometimes be seen protruding over the nest rim. Observers should also carefully search low perch sites such as fenceposts, plowed fields, and the inner branches of trees and shrubs; conduct spotting scope surveys of the sky and distant perches; watch for hawks and falcons attracted to evening bat flights, grassfires, or colonies of swallows, doves, or pigeons; and look closely at any raptors seen near tightly-bunched, erratically moving flocks of small birds.

How You Can Help

If you see an Aplomado Falcon or its nest, remember that they are vulnerable to disturbance, particularly during the nesting period. Observers should remain a safe distance away from the nest or perch (100 to 300 yards, depending on the sensitivity of the individual bird) and keep noise and other human impacts to a minimum.



Aplomado Falcon landi

© TPWD Glen M

Landowners and others are encouraged to report sightings or nests of Aplomado Falcons to Texas Parks and Wildlife Department, Endangered Resources Branch. Since this falcon is extremely rare in Texas, it is important to note the location (county and approximate distance and direction to nearest town), habitat type, behavior, and take a photograph if possible. Well-documented observations will help experts verify the sighting.

Owners and managers of large ranches in Texas can do a lot to enhance the recovery of the Aplomado Falcon. Well-planned brush management and periodic prescribed burning are management practices that can be used to maintain open rangelands and a vegetation structure favorable for these birds. Good grazing management practices, such as moderate stocking and rotational grazing will help to maintain productive rangelands able to support Aplomado Falcons.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Conservation Passports, available from Texas Parks and Wildlife are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas. Part of the proceeds from the sale of these items are used to purchase endangered species habitat and to provide information to park visitors and the public concerning endangered species. Conservation organizations also welcome your participation and support. Finally, you can encourage and support private landowners who are managing their land to protect habitat for birds of prey.

For More Information Contact

Texas Parks and Wildlife Department
Endangered Resources Branch
4200 Smith School Road
Austin, Texas 78744
(512) 912-7011 or (800) 792-1112

or

U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057

or

Laguna Atascosa National Wildlife Refuge
P.O. Box 450
Rio Hondo, Texas 78583
(512) 748-3607

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nterior Least Tern

ientific Name: *Sterna antillarum athalassos*

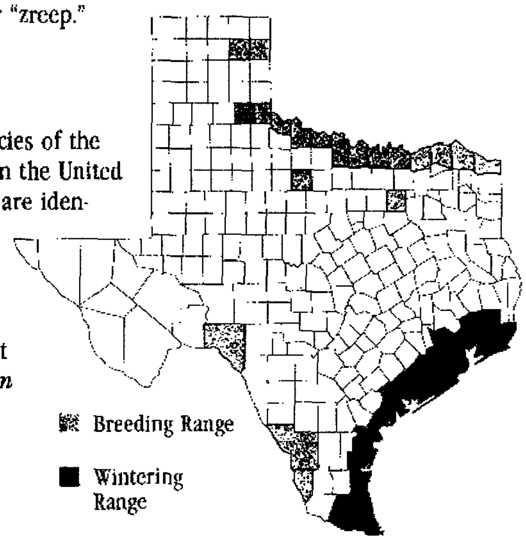
deral Status: Endangered, 6/27/85 • State Status: Endangered

Description

Least Terns are the smallest North American terns. Adults average 8 to 10 inches in length, with a 20 inch wingspan. Their narrow, pointed wings make them streamlined flyers. Males and females are similar in appearance. Breeding adults are gray above and white below, with a black cap, black nape and eye stripe, white forehead, yellow bill with a black or brown tip, and yellow to orange legs. Hatchlings are about the size of ping-pong balls and are yellow and buff with brown mottling. Fledglings (young birds that have left the nest) are grayish brown and buff colored, with white heads, dark bills and eye stripes, and stubby tails. Young terns acquire adult plumage after their first molt at about 1 year, but do not breed until they are 2 to 3 years old. The Least Tern's call has been described as a high pitched "kit," "zeep," or "zreep."

Interior Least Tern on nest
© Leroy Williamson

Least Tern and chick
© TPWD Glen Mills



Distribution and Habitat

There are three subspecies of the Least Tern recognized in the United States. The subspecies are identical in appearance and are segregated on the basis of separate breeding ranges. The Eastern or Coastal Least Tern (*Sterna antillarum antillarum*), which is not federally listed as endangered or threatened, breeds along the Atlantic coast from Maine to Florida and west along the Gulf coast to south Texas. The California Least Tern (*Sterna antillarum browni*), federally listed as endangered since 1970, breeds along the Pacific coast from central California to southern Baja California. The endangered Interior Least Tern (*Sterna antillarum athalassos*) breeds inland along the Missouri, Mississippi, Colorado, Arkansas, Red, and Rio Grande River systems. Although these subspecies are generally recognized, recent evidence indicates that terns hatched on the Texas coast sometimes breed inland. Some biologists speculate that the interchange between coastal and river populations is greater than once thought.

The Interior Least Tern is migratory, breeding along inland river systems in the United States and wintering along the Central American coast and the northern coast of South America from Venezuela to northeastern Brazil. Historically, the birds bred on sandbars on the Canadian, Red, and Rio Grande River systems in Texas, and on the Arkansas, Missouri, Mississippi, Ohio and Platte River systems in other states. The breeding range extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. It included the braided rivers of Oklahoma and southern Kansas, salt flats of northwest Oklahoma, and alkali flats near the Pecos River in southeast New Mexico.

Today, the Interior Least Tern continues to breed in most of the major river systems, but its distribution is generally restricted to the less altered and more natural or little disturbed river segments. In Texas, Interior Least Terns are found at three reservoirs along the Rio Grande River, on the Canadian River in the northern Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, and along the Red River (Texas/Oklahoma boundary) into Arkansas.

Nesting habitat of the Interior Least Tern includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. The birds prefer open habitat, and tend to avoid thick vegetation and narrow beaches. Sand and gravel bars within a wide unobstructed river channel, or open flats along shorelines of lakes and reservoirs, provide favorable nesting habitat. Nesting locations are often at the higher elevations away from the water's edge, since nesting usually starts when river levels are high and relatively small amounts of sand are exposed. The size of nesting areas depends on water levels and the extent of associated sandbars and beaches. Highly adapted to nesting in disturbed sites, terns may move colony sites annually, depending on landscape disturbance and vegetation growth at established colonies.

For feeding, Interior Least Terns need shallow water with an abundance of small fish. Shallow water areas of lakes, ponds, and rivers located close to nesting areas are preferred.

As natural nesting sites have become scarce, the birds have used sand and gravel pits, ash disposal areas of power plants, reservoir shorelines, and other manmade sites.

Life History

Interior Least Terns arrive at breeding areas from early April to early June, and spend 3 to 5 months on the breeding grounds. Upon arrival, adult terns usually spend 2 to 3 weeks in noisy courtship. This includes finding a mate, selecting a nest site, and strengthening the pair bond. Courtship often includes the "fish flight," an aerial display involving aerobatics and pursuit, ending in a fish transfer on the ground between two displaying birds. Courtship behaviors also include nest preparation and a variety of postures and vocalizations.

Least Terns nest in colonies, where nests can be as close as 10 feet but are often 30 feet or more apart. The nest is a shallow depression in an open, sandy area, gravelly patch, or exposed flat. Small twigs, pieces of wood, small stones or other debris usually lie near the nest.

Egg-laying begins in late May, with the female laying 2 to 3 eggs over a period of 3 to 5 days. The eggs are pale to olive buff and speckled or streaked with dark purplish-brown, chocolate, or blue-gray markings. Both parents incubate the eggs, with incubation lasting about 20 to 22 days. The chicks hatch within one day of each other and remain in the nest for about a week. As they mature, they begin to wander from the nest, seeking shade and shelter in clumped vegetation and debris. Chicks are capable of flight within 3 weeks, but the parents continue to feed them until migration. Least Terns will renest until late July if clutches or broods are lost.

The Interior Least Tern's activities during the breeding season are limited to the portion of river near the nesting site. Nesting adults defend an area surrounding the nest (territory) against intruders, and terns within a colony will defend any nest within that colony. When defending a territory, the incubating bird will fly up giving an alarm call, and then dive repeatedly at the intruder.

The breeding season is usually complete by late August. Prior to migration, the terns gather at staging areas with high fish concentrations. They gather to rest and eat prior to the long flight to southern wintering grounds. Low, wet sand or gravel bars at the mouths of tributary streams and floodplain wetlands are important staging areas. Interior Least Terns often return to the same breeding site, or one nearby, year after year.

Nesting success of terns at a particular location varies greatly from year to year. Because water levels fluctuate and nesting habitats such as sandbars and shorelines change over time, the terns are susceptible to habitat loss and frequent nest and chick loss.

The Interior Least Tern is primarily a fish-eater, feeding in shallow waters of rivers, streams, and lakes. The birds are opportunistic and tend to select any small fish within a certain size range. Feeding behavior involves hovering and diving for small fish and aquatic crustaceans, and occasionally skimming the water surface for insects.

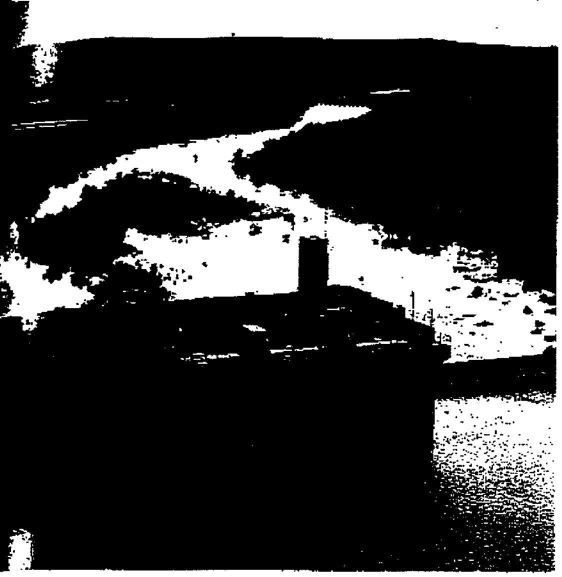
Least Tern chic
© TPWD Glen M

Nesting area and foraging site on the Canadian River
© Bruce C. Thompson

In portions of the tern's range, shorebirds such as the Piping Plover and Snowy Plover often nest in close proximity. The Piping Plover is listed as Threatened by the U.S. Fish and Wildlife Service, and the interior nesting populations of Snowy Plovers are U.S. Fish and Wildlife Service candidates for listing.

Threats and Reasons for Decline

Channelization, irrigation, and the construction of reservoirs and pools have contributed to the elimination of much of the tern's natural nesting habitat in the major river systems of the midwest. Discharges from dams built along these river systems pose additional problems for the birds nesting in the remaining habitat. Before rivers were altered, summer flow patterns were more predictable. The nesting habits of the Least Tern evolved to coincide with natural declines in river flows. Today, flow regimes in many rivers differ greatly from his-

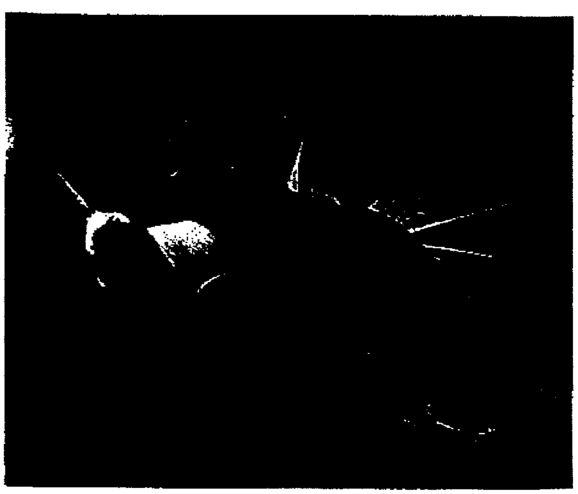


Dam on the Brazos River
© TPWD

toric regimes. High flow periods may now extend into the normal nesting period, thereby reducing the availability of quality nest sites and forcing terns to nest in poorer quality locations. Extreme fluctuations can inundate potential nesting areas, flood existing nests, and dry out feeding areas.

Historical flood regimes scoured areas of vegetation, providing additional nesting habitat. However, diversion of river flows into reservoirs has resulted in encroachment of vegetation and reduced channel width along many rivers, thereby reducing sandbar habitat. Reservoirs also trap much of the sediment load, limiting formation of suitable sandbar habitat.

In Texas and elsewhere, rivers are often the focus of recreational activities. For inland residents, sandbars are the recreational counterpart of coastal beaches. Activities such as fishing, camping, and ATV use on and near sandbar habitat are potential threats to nesting terns. Even sand and gravel pits, reservoirs, and other artificial nesting sites receive a high level of human use. Studies have shown that human presence reduces reproductive success, and human disturbance remains a threat throughout the bird's range.



Banding Least Terns
© Bruce C. Thompson

Water pollution from pesticides and irrigation runoff is another potential threat. Pollutants entering rivers upstream and within breeding areas can adversely affect water quality and fish populations in tern feeding areas. Least Terns are known to accumulate contaminants that can affect reproduction and chick survival. Mercury, selenium, DDT derivatives, and PCB's have been found in Least Terns throughout their range at levels warranting concern, although reproductive difficulties have not been observed.

Finally, too little water in some river channels may be a common problem that reduces the birds' food supply and increases access to nesting areas by humans and predatory mammals. Potential predators include coyotes, gray foxes, raccoons, domestic dogs and cats, common crows, great egrets, and great blue herons.

Recovery Efforts

State, federal, and private organizations throughout the United States are collaborating to census the birds, conduct research, curtail human disturbance, and provide habitat. Continued monitoring of confirmed and potential colony sites is underway to assess population status and reproductive success. Protective measures, including signs and fences, are being implemented to restrict access to sites most threatened by human disturbance. Vegetation control at occupied sites, chick shelter enhancement, predator control, pollution abatement, and habitat creation/restoration at unoccupied sites are management strategies used to benefit Interior Least Tern populations.

Biologists continue to assess habitat availability and quality throughout the bird's range in Texas, and identify essential habitat for management and protection. Recently, in a cooperative effort between the Texas Parks and Wildlife Department, National Park Service, International Boundary and Water Commission, Comision Internacional de Limites y Aguas, Oficina de Ecologia Estado de Coahuila, and City of Del Rio, warning signs in both Spanish and English were erected to inform visitors about the effects of human disturbance on the terns. Also, the National Park Service recently initiated annual status surveys for Interior Least Terns at Amistad NRA. Finally, public information campaigns concerning Least Tern conservation are a vital part of the recovery process.

Where To See Interior Least Terns

Falcon State Park near Falcon Heights in Zapata County (512) 848-5327, Amistad National Recreation Area near Del Rio in Val Verde County (210) 775-7491, and Gene Howe Wildlife Management Area near Canadian in Hemphill County (806) 323-8642 offer visitors the opportunity to see and learn more about the Interior Least Tern. Often, the best opportunity to see the birds is by boat. Please remember that human disturbance during the nesting season reduces reproductive success and threatens survival. The terns should be viewed from a distance with binoculars or spotting scope.

How You Can Help

Interior Least Terns and other colonial nesting shore and water birds (plovers, herons, egrets, spoonbills, ibis, gulls, and skimmers) often nest on sandbars and islands. These areas offer protection from predators, but the birds are still vulnerable to human disturbance. Since the hot sun can quickly kill small chicks and embryos in unhatched eggs if the adults are flushed from the nest, you can help by staying off sandbars and islands and away from flats and shorelines where birds are nesting. Also, when adults are flushed from the nest, the eggs or young are more vulnerable to predation. Nesting areas maintained as bird sanctuaries are identified by official signs. If you want to observe the birds, bring binoculars and stay a safe distance away so you don't disturb the birds. Pets and livestock should also be kept off these areas while the terns are nesting. Remember that state and federal laws protect migratory and endangered birds, and harassing them at any time is illegal.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Conservation Passports, available from Texas Parks and Wildlife, are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas. Part of the proceeds from the sale of these items are used to protect habitat and to provide public information concerning endangered species conservation. Conservation organizations in Texas welcome your participation and support.

For More Information Contact

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Endangered Resources Branch
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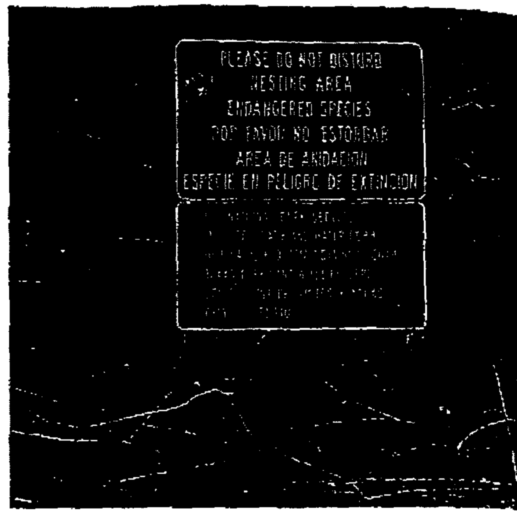
Austin, Texas 78744
(512) 912-7011 or (800) 792-1112
or
U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057



Bilingual "Do not Disturb"

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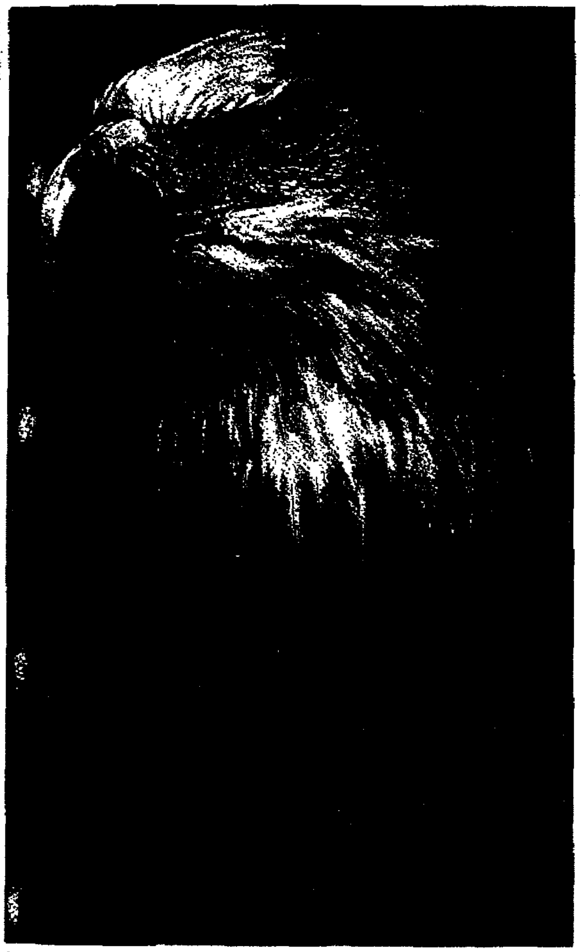
Bald Eagle

Scientific Name: *Haliaeetus leucocephalus*

Federal Status: Threatened • State Status: Threatened

Description

The Bald Eagle is one of nature's most impressive birds of prey. Males generally measure 3 feet from head to tail, weigh 7 to 10 pounds, and have a wingspan of 6 to 7 feet. Females are larger, some reaching 14 pounds with a wingspan of up to 8 feet. Adults have a white head, neck, and tail and a large yellow bill.

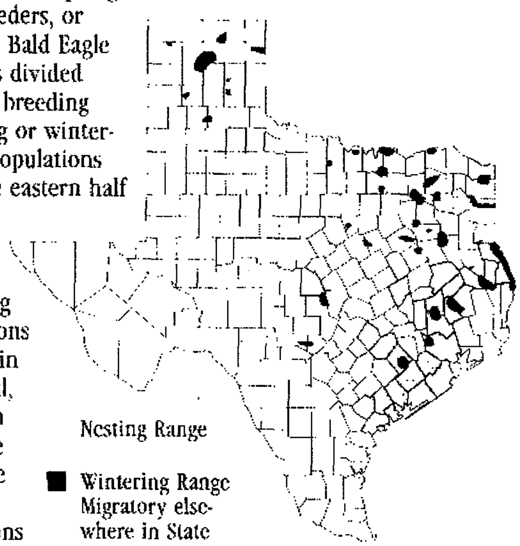


Bald Eagle
© TPWD Martin Fuller

First year birds are mostly dark and can be confused with immature Golden Eagles. Immature Bald Eagles have blotchy white on the underwing and tail, compared with the more sharply defined white pattern of Golden Eagles. While gliding or soaring, Bald Eagles keep their wings flat, and their wingbeats are slow and smooth. In contrast, Turkey Vultures soar with uplifted wings, and they fly with quick, choppy wingbeats. Bald Eagles require 4 or 5 years to reach full adult plumage, with distinctive white head and tail feathers.

Distribution and Habitat

The Bald Eagle, our National Symbol, occurs throughout the United States, Canada, and northern Mexico. Bald Eagles are present year-round throughout Texas as spring and fall migrants, breeders, or winter residents. The Bald Eagle population in Texas is divided into two populations; breeding birds and nonbreeding or wintering birds. Breeding populations occur primarily in the eastern half of the state and along coastal counties from Rockport to Houston. Nonbreeding or wintering populations are located primarily in the Panhandle, Central, and East Texas, and in other areas of suitable habitat throughout the state.



Nesting populations are gradually increasing in most areas of the country, including Texas. Between 1985 and 1990, a 47% increase in active nests and a 55% increase in numbers of fledglings were reported. Breeding territories are located mostly along rivers and near reservoirs in East Texas, the Post Oak region, and along the Gulf Coast. The colonization of inland reservoirs by nesting Bald Eagles is a rather recent event, since this habitat type was not used by eagles historically. As of 1994, Bald Eagle nests were known to occur in Angelina, Bastrop, Bowie, Brazoria, Calhoun, Chambers, Colorado, Cooke, Fannin, Fayette, Fort Bend, Goliad, Grimes, Harris, Houston, Jackson, Liberty, Limestone, Matagorda, Montgomery, Newton, Polk, Refugio, Robertson, Sabine, San Augustine, San Saba, Shelby, Trinity, Victoria, and Wharton Counties.

Preferred nesting habitat in Texas is undisturbed coastal regions, or along river systems or lake shores with large, tall (40-120 ft.) trees for nesting and roosting. Nests are usually located within 1 to 2 miles of large bodies of water, such as lakes, reservoirs or rivers, and are often located in the ecotone or edge between forest and marsh or water. Bald Eagles often build their nests in the tallest trees in an area, providing an unobstructed flight path to the nest. Nests are built in a variety of tree species. In east Texas eagles nest primarily in loblolly pine. Throughout the rest of the breeding range in Texas, nests are found in a variety of trees, including bald cypress, water oak, live oak, American elm, cottonwood, sycamore, and pecan. Open water or wetland areas located within approximately one mile of nesting habitat are needed to provide feeding areas.

Most of the Bald Eagles seen in Texas breed in the northern states and spend the winter (December through March) in Texas. Wintering populations may occur statewide, but generally are found near large lakes and reservoirs, such as Lake Meredith, Buffalo Lake, Lake Texoma, Wright-Patman Lake,

Lake O' the Pines, Lake Fork, Lake Tawakoni, Lake Whitney, Lake Fairfield, Toledo Bend Reservoir, Sam Rayburn Reservoir, Lake Livingston, Lake Conroe, Lake Buchanan, Lake Cooper, Lake Palestine, Lake Pat Mayse, Lake Warren, and Palo Duro Lake.

Bald Eagle wintering habitat is characterized by abundant, readily available food sources. Most wintering areas are associated with open water, where eagles feed on fish or waterfowl. Wintering populations are also found on rangelands of the Davis Mountains, western Edwards Plateau, and the Panhandle, where eagles may take rabbits and feed on carrion.

The availability of night roost sites is often an important characteristic of wintering habitat. Bald Eagles may roost singly or in groups, and the same roosts are used from year to year. Roost trees are usually the oldest and largest trees in an area, and most have large horizontal limbs and open branching that allows plenty of room for takeoff and landing. Eagles generally choose roosts that allow unobstructed visibility to the surrounding areas, with a minimum of human activity in the immediate vicinity. Roost sites are often located near water, but eagles also roost on windbreaks and in secluded canyons well away from water.

Life History

Bald Eagles are opportunistic predators. They feed primarily on fish, but also eat a variety of waterfowl and other birds, small mammals, and turtles, when these foods are readily available. Carrion is also common in the diet, particularly in younger birds during the winter. Bottom-dwelling fish tend to occur more frequently in the diet. It is thought that the downward visual orientation of bottom-feeding fish makes them more vulnerable to eagle attacks than surface sight-feeders, which are more aware of movements from above. Eagles capture fish by extending their talons a few inches below the water's surface. Therefore, live fish are vulnerable only when near the surface or in shallows. Studies in Texas have shown that eagles commonly eat coots, catfish, roughfish, and soft-shell turtles.

In Texas, Bald Eagles nest from October to July. Nests are constructed primarily by the female, with the male assisting. The typical nest is constructed of large sticks, with softer materials such as leaves, grass, and spanish moss used as nest lining. Nests are typically used for a number of years, with the birds adding nest material every year. Bald Eagle nests are often very large, measuring up to 6 feet in width and weighing hundreds of pounds. Eagles often have one or more alternative nests within their territories.

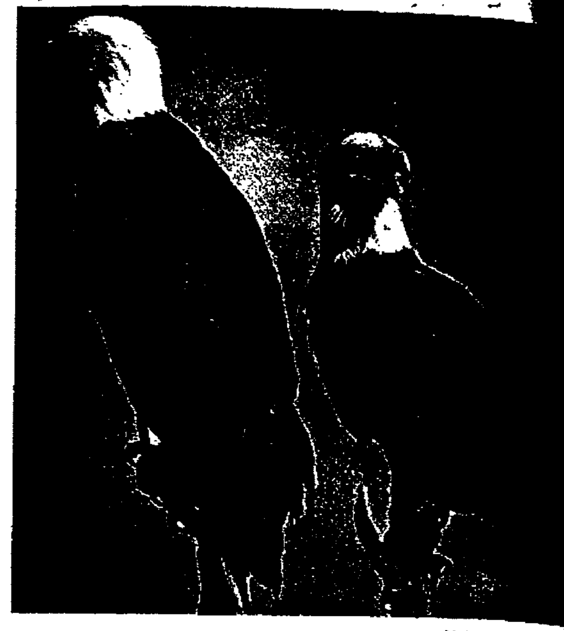
Peak egg-laying occurs in December, with hatching primarily in January. The female lays a clutch of 1 to 3 eggs, but the usual clutch is 2 eggs. A second clutch may be laid if the first is lost. Incubation begins when the first egg is laid and usually lasts 34 to 36 days. The young generally fledge (fly from the nest) in 11 to 12 weeks, but the adults continue to feed them for another 4 to 6 weeks while they learn to hunt. When they are on their own, young Bald Eagles migrate northward out of Texas, returning by September or October.

Nest surveys in Texas from 1981-1991 have shown that 64% of the nests successfully produced young, with production averaging 1 young per active nest found. Studies show that at least 70% of the juveniles survive their first year. Causes of first year mortality include disease, lack of food, inclement weather, and human interference.

Bald Eagles reach sexual maturity at 4 to 6 years of age; however, they have been known to successfully breed at 3 years. They are monogamous and are believed to mate for life; however, if one of the pair dies, the surviving bird will accept another mate. Bald Eagles are believed to live up to 30 years or more in the wild.

Threats and Reasons for Decline

Habitat loss over the past 200 years is the factor most consistently associated with declines in Bald Eagle populations. Unfortunately for eagles, people also like to live and



Mature Bald Eag
© USF

spend their leisure time near water. In recent decades, the accelerated pace of development along the coast and near inland rivers and waterways is a primary cause of habitat loss. There are, however, encouraging signs in Texas that a significant amount of new habitat has been created in the form of man-made reservoirs. Reservoirs primarily provide habitat for wintering birds, but they are gradually receiving more use by nesting eagles. Hopefully, if human disturbance is kept to a minimum, a redistribution of nesting to reser-

Young eagles in nest
© TPWD Jim Whitcomb

voirs may offset some habitat loss in other areas.

Shooting has long been recognized as a major human-caused factor in the decline of Bald Eagles. Although primarily fish and carrion eaters, eagles were thought to be a major threat to chickens, livestock, and game animals. As a consequence, many were killed by farm-

Bald Eagle nest
© TPWD Leroy Williamson

ers, ranchers, and hunters. In 1940, Congress passed the Bald Eagle Protection Act, which made it illegal to shoot or harass eagles. In 1969, Bald Eagles gained further legal protection under federal endangered species laws. With heightened public awareness and sensitivity to the plight of the Bald Eagle, coupled with strict laws,

Juvenile Bald Eagles
© TPWD Mark Mitchell

shooting mortality has declined from 62% of total reported deaths from 1961-1965 to 18% from 1975-1981. Although this downward trend is encouraging, shooting mortality could still be a limiting factor, particularly in remote areas.

Human disturbance can also be a cause of population decline. Activities such as logging, construction, and recreational activity certainly do disturb eagles in some instances. However, the impact of these disturbances is highly variable, depending on the activity, its frequency and duration, its proximity to areas used by eagles, the extent to which the activity modifies the habitat or its use, and timing in relation to the reproductive cycle. Also, some birds are more tolerant of disturbance than others, with adults generally less tolerant than immatures. Despite this variability, disturbance near nests has caused nesting failures.

Finally, the most dramatic declines in Bald Eagle populations nationwide resulted from environmental contaminants. Beginning in 1947, reproductive success in many areas of the country declined sharply, and remained at very low levels through the early 1970's. After several years of study, the low reproduction of Bald Eagles and many other birds was linked to widespread use of the insecticides DDT and Dieldren. These insecticides were used extensively in agriculture and forestry beginning in 1947. As DDT entered watersheds, it became part of the aquatic food chain, and was stored as DDE in the fatty tissue of fish and waterfowl. As eagles and other birds of prey fed on these animals, they accumulated DDE in their systems.

Although occasionally causing death, DDE mainly affected reproduction. Some birds affected by the chemical failed to lay eggs, and many produced thin eggshells that broke during incubation. Eggs that did not break were often addled or contained dead embryos, and the young that hatched often died. Dieldren killed eagles directly rather than causing thin eggshells, but compared to DDT, Dieldren was probably not as important in overall Bald Eagle declines. In 1972, the EPA banned the use of DDT in the United States. Since the ban, DDE residues in Bald Eagle eggshells have dropped significantly, and a slow recovery of eagle productivity has occurred. Most populations appear to be producing chicks at the expected rate.

Of more recent concern is evidence that lead poisoning may be a significant cause of death in eagles. Chronic low levels of lead can produce nervous system disorders, affect behavior and learning, cause anemia, and increase susceptibility to disease. As laws requiring the use of steel shot to hunt waterfowl become effective, accumulation of lead in the food chain is expected to decline.

Since 1981, Texas Parks and Wildlife Department has conducted extensive aerial surveys to monitor active Bald Eagle nests. The 1995 survey identified 40 active nests. Twenty-eight of the active nests fledged 45 young. This compares with only 7 known nest sites in 1971. Midwinter Bald Eagle counts coordinated by TPWD and conducted by birding enthusiasts throughout the state reported 303 eagles in 1995. From 1986-1989, midwinter counts averaged less than 15 Bald Eagles per survey site. Since 1990, the average number of eagles per survey site has increased to 18. These numbers show encouraging trends for Texas. With continued vigilance, protection, and informed management, today's Texans can insure that future generations will have the opportunity to enjoy the sight of our majestic national symbol - the only eagle unique to North America.

Recovery Efforts

During the 1970's and 1980's, major efforts were directed toward captive breeding and reintroducing young birds into the wild. A total of 124 Bald Eagles were hatched at the Patuxent Wildlife Research Center in Maryland from 1976-1988. These captive-hatched eaglets were an important source for restocking wild populations. One successful reintroduction program placed young eaglets in the nests of adults whose own eggs were infertile or failed to hatch. The "foster" parents readily adopted the chicks and raised them as their own. Another method, called "hacking" places young birds on man-made towers in suitable habitat where populations are low. The nestlings are kept in an enclosure and fed by humans that stay out of sight. When they are able to fly, the enclosure is opened and the birds are free to leave. Food is still provided at the release site until no longer used or needed by the young birds. Hacking has been used very successfully in at least 11 states.

In Texas, the greatest challenge for the future will be to prevent further destruction of habitat. The Texas Parks and Wildlife Department, in cooperation with other agencies and conservation groups, is continuing to monitor Bald Eagle breeding and wintering populations and nesting success. Monitoring of nesting success is particularly important in detecting any problems associated with contaminants in the environment.

Finally, appropriate management of nesting, feeding, loafing, and wintering habitat must be a priority if we are to maintain the current upward trend in Bald Eagle numbers in Texas.

Where To See Bald Eagles

There are a number of State Parks where visitors have the opportunity to see and learn more about Bald Eagles. These include Lake Brownwood, Lake Livingston, Lake Texana, Lake Whitney, and Possum Kingdom State Parks. The Vanishing Texas Rivers Cruise, a privately operated excursion boat, also provides visitors with excellent opportunities to see wintering eagles on Lake Buchanan in Burnet and Llano Counties.

Because the Bald Eagle is a protected species and sensitive to human disturbance, birders and other observers should carefully follow certain viewing ethics. Recorded calls of prey species should not be used to attract birds. Also, observers should be careful not to approach too closely or otherwise disturb or stress birds.

How You Can Help

If you see a Bald Eagle nest, remember that eagles are vulnerable to disturbance throughout the nesting period (October to July in Texas), and are easily disturbed particularly during the first 12 weeks of nesting activity. Observers should remain a safe distance away from the nest (at least 750 feet) and keep noise and other human impacts to a minimum. Private landowners are encouraged to report new Bald Eagle nests to Texas Parks and Wildlife Department.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Conservation Passports, available from Texas Parks and Wildlife, are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas. Part of the proceeds from the sale of these items is used to provide information to park visitors and the public concerning endangered species. Conservation organizations in Texas also welcome your participation and support. Finally, you can encourage and support private landowners who are minimizing nest disturbance and managing their land to protect Bald Eagle habitat.

For More Information Contact

Texas Parks and Wildlife Department
Endangered Resources Branch
4200 Smith School Road
Austin, Texas 78744
(512) 912-7011 or (800) 792-1112

or

U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057

Management guidelines are available from Texas Parks and Wildlife Department or the U.S. Fish and Wildlife Service for landowners wishing to protect and manage Bald Eagle habitat.

Placing wing tags on Bald Eagles
© TPWD Leroy Williamson

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Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

Eastern Brown Pelican

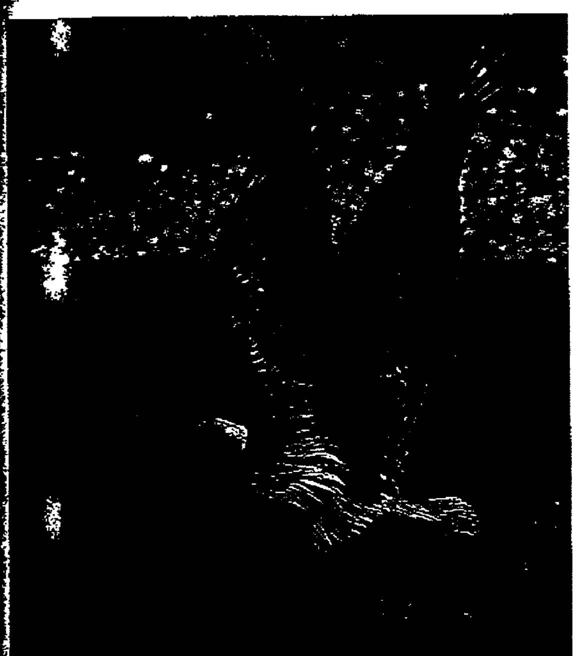
Scientific Name: *Pelecanus occidentalis occidentalis*

Federal Status: Endangered, 10/13/70 • State Status: Endangered

The Eastern Brown Pelican has recovered sufficiently in Florida, Alabama, and the United States Atlantic coast to be delisted. Although numbers are increasing in Louisiana and Texas, it is currently still listed as Endangered in Texas and Louisiana.

Description

With its 6 foot wingspread and 18-inch bill with pouch along the underside, no other bird could be easily mistaken for this unique seashore dweller. Possessing broad wings and a bulky body, a Brown Pelican weighs about 9 pounds. A graceful flier, the pelican's powerful wingbeat is one of the slowest among birds. Its feet are webbed to provide power while swimming in or under the water.



Brown Pelican © TPWD Glen Mills

Nonbreeding adults have a white head and neck, often washed with yellow; a grayish-brown body; and a dark brown to black belly. In breeding birds, the back of the neck is a dark chestnut color with a yellow patch at the base of the foreneck. Some breeding birds develop red or plum colored pouches. Adults molting during incubation and chick-feeding have cream-colored heads and necks. Juveniles are grayish-brown above with whitish underparts. Young birds appear more brown in color as they age, acquiring adult plumage by their third year.

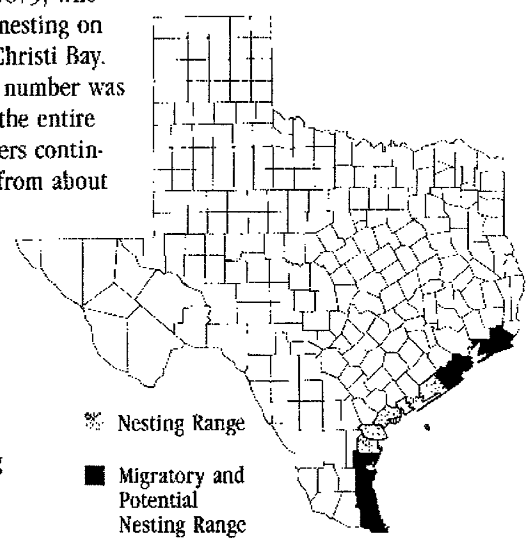
Distribution and Habitat

Historically, the Brown Pelican was found in large numbers along the Atlantic and Gulf coasts from South Carolina to Florida and west to Texas. Today, the birds occur throughout their historic range but their numbers have been greatly reduced.

The earliest population estimate of Brown Pelicans in Texas was that of Sennett in 1879, who estimated 5,000 adults nesting on two islands in Corpus Christi Bay. By 1918, the estimated number was 5,000 birds nesting on the entire Texas coast. The numbers continued to decline sharply from about 1,034 breeding birds on the central coast in 1939 to only 50 birds in 1964. During the period 1967-1974, the Texas population was estimated to be less than 100 birds, with fewer than 10 breeding pairs. Only 40 young were fledged on the entire Texas coast during this period.

Today, Brown Pelicans are found along the Texas coast from Chambers County on the upper coast to Cameron County on the lower coast. Most of the breeding birds nest on Pelican Island in Corpus Christi Bay and Sundown Island near Port O'Connor, both National Audubon Society Sanctuaries. Smaller groups or colonies occasionally nest on Bird Island in Matagorda Bay, a series of older spoil islands in West Matagorda Bay, Dressing Point Island in East Matagorda Bay, and islands in Aransas Bay. Pelican numbers have increased slowly from very low levels in the 1960's and 1970's to an estimated 2,400 breeding pairs in 1995.

Brown Pelicans nest on small, isolated coastal islands where they are safe from predators such as raccoons and coyotes. Nesting habitat ranges from mud banks and spoil islands to offshore islands covered with mangroves and other woody vegetation. Part of the Texas population spends the nonbreeding season along the Texas coast, while others migrate south to spend the winter along the eastern coast of Mexico.



Life History

It is quite an experience to watch a Brown Pelican feeding. Soaring overhead, the bird spots a fish near the surface and keeps it in sight. Rotating into a dive, the pelican plunges 30 to 60 feet bill-first into the water. The impact of hitting the water with such force would stun an ordinary bird, but the Brown Pelican is equipped with air sacs just beneath the skin to cushion the blow. As it enters the water, the loose skin on the underside of the bill extends to form a scoop net with an amazing capacity of 2.5 gallons. If the dive is successful, the pelican quickly drains the water from its pouch and tosses its head back to swallow the fish.

Brown Pelicans can often be seen flying in formation with slow powerful wingbeats, searching the water for Menhaden and Mullet, which form the major portion of their diet. Several studies of food habits have shown that the diet of Brown Pelicans consists almost entirely of these fish. In one study, Menhaden was by far the most prevalent fish found regurgitated and left lying in pelican colonies. Since gamefish considered desirable by fisherman are not typically included in the pelican's diet, the birds do not compete with man for food.

Brown Pelicans breed in the spring, building their nests in mangrove trees or on the ground. Nests vary greatly in size and structure, consisting of piles of sticks, grass, reeds and other available vegetation. Pelicans usually lay two to four white eggs which are often stained brown by nest materials. The young hatch in about 30 days. Newly hatched pelicans appear helpless indeed, with their black, featherless, leathery skin. They are blind at first and completely dependent upon their parents for food and protection. Until the young birds develop a coat of down, about two weeks after hatching, it is often necessary for the adults to shade them from the direct rays of the sun, which can be fatal.

Young pelicans are fed by both parents. Using its pouch as a feeding trough, the adult regurgitates semidigested fish into it for the young to eat. As the young pelicans grow, they reach farther into the pouch, occasionally reaching down the parent's throat for food. The young are fed for about nine weeks. During this time, each nestling will devour about 150 pounds of fish. The parents spend most of every day catching fish to satisfy the ravenous appetites of their offspring.

Although mortality from predators, weather, and accidents is high for hatchlings, once on their own, Brown Pelicans have a fairly long life span. Adult survival approaches 80 percent per year, and some birds live 30 years or longer.

Threats and Reasons for Decline

Brown Pelican numbers in Texas began to decline sharply in the 1920' and 1930's, when adult birds were killed and nesting colonies destroyed by fisherman, in the mistaken belief that pelicans compete with man for food. It is estimated that pelican numbers declined by more than 80% in just 16 years, between 1918 and 1934.

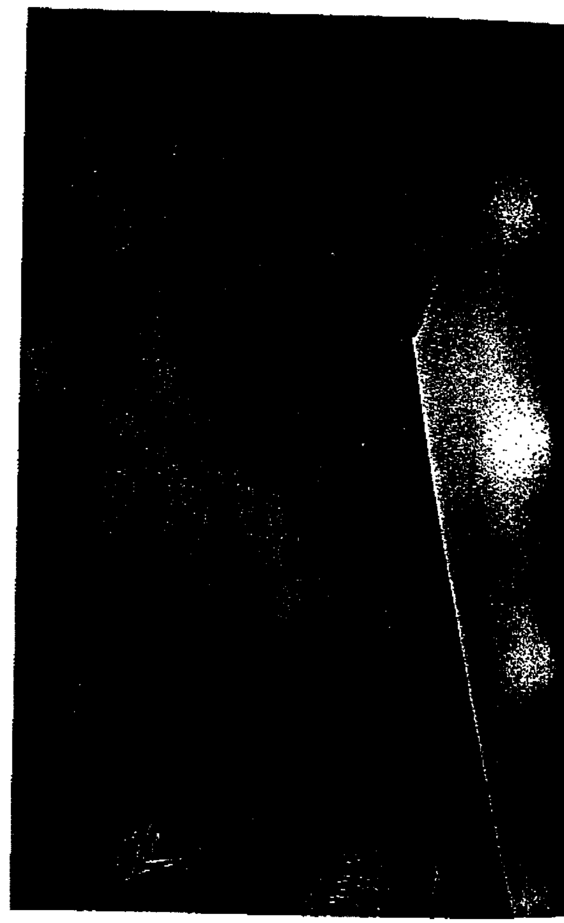
Even more damaging, however, was the widespread use of DDT and similar insecticides beginning in the late 1940's. These insecticides were used on farmlands across the United States and in coastal areas to control mosquitoes. DDT does not usually kill adult birds, but it does interfere with calcium metabolism. The result is that the birds lay thin-shelled eggs that break during incubation or are too thin to protect the embryo. Pelicans are fish eaters, and fish are great accumulators of all toxic chemicals that get into coastal waters. The pelican's favorite food, Menhaden, a small filter-feeding fish, trap plankton for food. The plankton absorbed DDT residues from runoff. Thus, the concentration of DDT and Endrin in the environment had a devastating impact on the reproduction of Brown Pelicans, along with other top-of-the-food-chain birds such as Bald Eagles, Ospreys, and Peregrine Falcons. Recovery of these species has been steady since the early 1970's, when DDT and Endrin were banned in the United States.

In Texas today, the major threats to the continued recovery of the Brown Pelican appear to be human disturbance and loss of nesting habitat. Pelicans need safe places to nest, away from predators and man. Many former nesting sites have become accessible to both due to new construction and siltation. The hope is that as the pelican population expands, the birds will colonize the more remote islands still available as nesting sites.

Ongoing Recovery Efforts

The National Audubon Society, U.S. Fish and Wildlife Service, and Texas Parks and Wildlife Department have combined forces to count, band, and inspect the Brown Pelican nesting colonies. Brown Pelicans banded

Brown Pelican with yo



Brown Pelican in non-breeding plumage
© TPWD Leroy Williamson

on the central Texas coast have been reported from the Louisiana coast, Mobile Bay, Alabama, Naples, Florida, and the northeastern coast of Yucatan. Researchers are studying the migration patterns of Brown Pelicans, particularly movements between Texas and Mexico.

Biologists continue to monitor the nesting success of pelicans at existing colonies and surveying the bays for possible new nesting sites. One recently developed technique

Banding pelicans
© TPWD

involves placing pelican decoys near suitable islands in an effort to establish new nesting colonies.

Also, individuals from Texas Parks and Wildlife Department and the National Audubon Society regularly patrol the nesting islands to help minimize the effects of human disturbance. Many of the islands are owned or leased by the National Audubon Society as colonial waterbird nesting sanctuaries. These islands are regularly posted and patrolled.

Where To See Brown Pelicans

Matagorda Island and Mustang Island State Parks and Padre Island National Seashore offer visitors the opportunity to see and learn more about Brown Pelicans. Public piers and jetties, such as those in Port Aransas, are also good places to watch pelicans.

What You Can Do To Help

Brown Pelicans and other colonial nesting birds (herons, egrets, spoonbills, ibis, terns, gulls, and skimmers) nest on islands. Islands offer protection from predators, but the birds are still vulnerable to human disturbance. Since the hot sun can kill small chicks and embryos in unhatched eggs in a matter of minutes if the adults are flushed from the nests, you can help by staying off islands where birds are nesting. Islands maintained as bird sanctuaries are identified with posted signs. Boaters wishing to observe the birds should bring binoculars and stay behind designated signs so as not to disturb the birds. And whatever you do, don't get off the boat. Pelicans (and other birds) will become agitated and leave their nests if approached. Remember that state and federal laws protect nongame and endangered species, and harassing the birds at any time is illegal. The Endangered Species Act provides protection for listed species against any action that significantly disrupts normal behavior patterns, including breeding, feeding, or sheltering.

Occasionally, a Brown Pelican will mistake a fishing lure or bait for a swimming fish and accidently gets hooked. If this happens to you, don't just cut the line and leave the bird with trailing line that can entangle and kill it. Gently reel the pelican in. Even though pelicans are big birds, they are not that strong, and this is easy to do. Grab the bill first and then fold the wings up to restrain the bird. Next, remove all fishing line and try to remove the hook. Cut the barb or push the hook through, just as you would for a person. If the hook is impossible to remove, leave it in and release the bird.

For years, pelicans reared in Texas have been banded. If you see a pelican with a colored plastic band or an aluminum U.S. Fish and Wildlife Service band on its leg, note which leg, the color of the band, the date, and the location. Send a post card to: Bird Banding Laboratory, U.S. Fish and Wildlife Service, Laurel, Maryland, 20811. This valuable information will help biologists to better understand the life cycle and movements of Brown Pelicans in Texas.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Part of the proceeds from the sale of these items are used to conserve habitat and provide information concerning rare and endangered species. Conservation Passports, available from Texas Parks and Wildlife, are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas. Conservation organizations in Texas also welcome your participation and support.

For More Information Contact

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Whooping Crane

ientific Name: *Grus americana*

deral Status: Endangered, 6/2/70 • State Status: Endangered

Description

The stately Whooping Crane is the tallest bird found in North America, with males approaching nearly five feet in height. Adult birds are white overall with some red and black on the head. Their inner wing feathers droop over the rump in a "bustle" that distinguishes cranes from herons. With a seven foot wingspan and a slow wingbeat, Whooping Cranes fly with their long necks and legs fully extended. When in flight, the birds' black wingtips or primary feathers

ing Crane
S Steve Van Riper

can be seen, and their long legs extend beyond their tail. Their dark olive-gray beaks are long and pointed. The area at the base of the beak is pink and the eyes are yellow. The Whooping Crane's call, from which it derives its name, has been described as a shrill, bugle-like trumpeting.

Whooping Crane chicks are a reddish cinnamon color. At four months of age, white feathers begin to appear on the neck and back. Juvenile feathers are replaced through the winter months. By the following spring, juvenile plumage is primarily white, with rusty colored feathers remaining only on the head, upper neck, and on the tips of wing feathers. Young birds generally have adult plumage by late in their second summer.

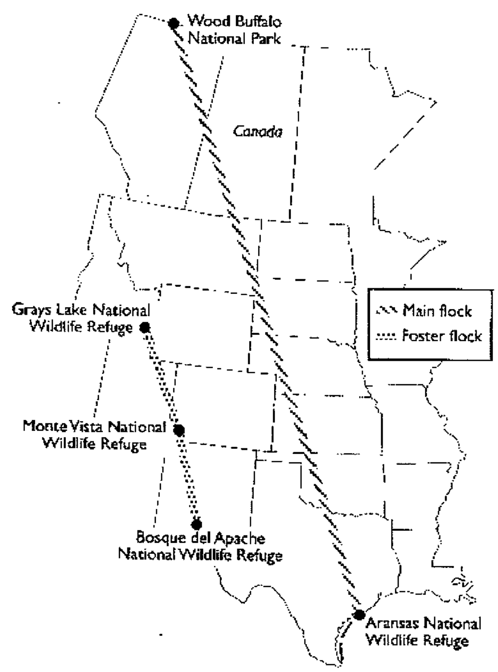
There are a number of birds which may appear similar to the Whooping Crane. The Sandhill Crane, the Whooping Crane's closest relative, is gray in color, not white. Also, Sandhill Cranes are somewhat smaller, with a wingspan of about five feet. Sandhill Cranes occur in flocks of two to hundreds, whereas Whooping Cranes are most often seen in flocks of two to as many as 10-15, although they sometimes migrate with Sandhill Cranes. Snow Geese and White Pelicans are white birds with black wingtips, however both of these birds have short legs that do not extend beyond the tail when in flight. In addition, Snow Geese generally occur in large flocks, are much smaller, and fly with a rapid wingbeat. White Pelicans fly with their neck folded and can be distinguished by their long yellow bill. Finally, swans are all white and have short legs, and herons and egrets fly with their long necks folded.

Status and Distribution

The historical range of the Whooping Crane extended from the Arctic coast south to central Mexico, and from Utah east to New Jersey, South Carolina, Georgia, and Florida. Distribution of fossil remains suggest a wider distribution during the cooler, wetter climate of the Pleistocene.

It has been estimated that between 500 and 1400 Whooping Cranes inhabited North America in 1870. Although the exact number is unknown, Whooping Cranes were uncommon, and their numbers rapidly declined by the late 19th century.

In the mid 1800's, the principal breeding range extended from central Illinois northwestward through northern Iowa, western Minnesota, northeastern North Dakota, southern Manitoba and



Saskatchewan, to the area near Edmonton, Alberta. The Whooping Crane disappeared from the heart of its breeding range in the north-central United States by the 1890's. The last documented nesting in southern Canada occurred in Saskatchewan in 1922. By 1937, only two small breeding populations remained; a nonmigratory population in southwestern Louisiana, and a migratory population which wintered on the Aransas National Wildlife Refuge (NWR) on the Texas coast and nested in a location which at that time was unknown. The remnant population in southwestern Louisiana was reduced from 13 to 6 birds following a hurricane in 1940, and the last individual was taken into captivity in 1950. In the winter of 1938-39, only 14 adult and 4 juvenile Whooping Cranes were found on the Aransas NWR. The nesting area of the Aransas Wildlife Refuge population was discovered in 1954 in Wood Buffalo National Park, Northwest Territories, Canada. This population is the only historical one that survives.

Whooping Cranes currently exist in three wild populations. The only self-sustaining wild population is the one that winters on the Texas coast and nests primarily within Wood Buffalo National Park. In 1995, this population consisted of 43 nesting pairs, with a total of 133 birds wintering in Texas.

Another wild flock includes eight individuals reared by wild sandhill cranes at Grays Lake National Wildlife Refuge in southeastern Idaho. In 1975, Whooping Crane eggs were transferred from Wood Buffalo to Grays Lake in an effort to establish a migratory population in the Rocky Mountains. The Rocky Mountain birds spend the summer in Idaho, western Wyoming, and southwestern Montana, and winter in the middle Rio Grande Valley of New Mexico.

The third wild population consists of 24 birds remaining from 51 captive-reared Whooping Cranes released in the Kissimmee Prairie of Florida from 1993-1995. These birds were released as the first step in an effort to establish a nonmigratory population in Florida.

Habitat

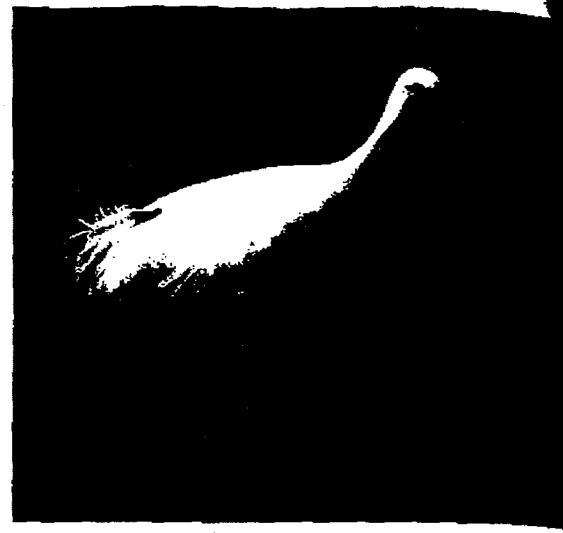
Within Wood Buffalo National Park, Whooping Cranes nest in poorly drained wetlands interspersed with numerous potholes (small areas of open water). These wetlands are separated by narrow ridges which support trees such as white and black spruce, tamarack, and willows, and shrubs such as dwarf birch, Labrador tea, and bearberry. Bulrush is the dominant plant in areas used by nesting birds, although cattail, sedge, musk-grass and other aquatic plants are common. Nest sites are often located in the rushes or sedges of marshes and sloughs, or along lake margins. An abundance of invertebrates, such as mollusks, crustaceans, and aquatic insects have been found in the ponds near occupied nests.

Whooping Cranes use a variety of habitats during their long migrations between northern Canada and the Texas coast. Croplands are used for feeding, and large wetland areas are used for feeding and roosting. Whooping Cranes are known to roost in riverine habitat along the Platte, Middle Loup, and Niobrara Rivers in Nebraska, Cimarron River in Oklahoma, and the Red River in Texas. The birds often roost on submerged sandbars in wide unobstructed channels isolated from human disturbance. Whooping Cranes also use large wetland areas associated with lakes for roosting and feeding during migration.

The Whooping Crane's principal wintering habitat consists of about 22,500 acres of marshes and salt flats on Aransas National Wildlife Refuge and adjacent publicly and privately owned islands. Plants such as salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eye dominate the outer marshes. Further inland, Gulf cordgrass is more common. The interior portions of the refuge are characterized by oak mottes, grassland, swales, and ponds on gently rolling sandy soils. Live oak, redbay, and bluestems are typical plants found on upland sites. During the last 20 years, upland sites have been managed using grazing, mowing, and controlled burning. About 14,250 acres of grassland are managed for cranes, waterfowl, and other wildlife.

Life History

Whooping Cranes usually mate for life, although they will remate following the death of their mate. They mature at 3 to 4 years of age, and most females are capable of producing eggs by 4 years of age. It is estimated that Whooping Cranes can live up to 22 to 24 years in the wild. Captive individuals live 30 to 40 years.



Whooping Crane at Aransas National Wildlife Refu

© TPWD • Bil Re

Whooping Crane chick

© USFWS

Whooping Cranes begin leaving the Texas coast in late March and early April, returning to their nesting area in Wood Buffalo National Park by late April. Experienced pairs arrive first and normally nest in the same vicinity each year. Nesting territories vary considerably in size, ranging from 0.5 to 18 square miles. From the start of egg laying until the chicks are a few weeks old, the birds' activities are restricted to the breeding territory. Eggs are normally laid in late April to mid May, and hatching occurs one month later. Most nests contain 2 eggs. The eggs are light-brown or olive-buff in color with dark, purplish-brown blotches primarily at the blunt end. Whooping Cranes will renest if their first clutch is destroyed during the first half of the incubation period. They usually nest each year, but occasionally a

rial view of Aransas National Wildlife Refuge
TPWD

hooping Crane in flight
TPWD Bill Reaves

pair will skip a nesting season for no apparent reason. When nesting conditions are unsuitable, some pairs do not attempt to nest.

Whooping Crane parents share incubation and brood-rearing duties, and one member of the pair remains on the nest at all times. Females take the primary role in feeding and caring for the young. During the first 3 to 4 days after hatching, parents and young return to the nest each night. After that, the young are protected by their parents wherever they happen to be during inclement weather or at nightfall. During the first 20 days after hatching, families generally remain within 1 mile of the nest site.

Whooping cranes feed by probing the soil with their bills or taking food items from the soil surface or vegetation. Parents feed young chicks. Summer foods include large insect nymphs or larvae, frogs, rodents, small birds, minnows, and berries.

Fall migration begins in mid-September. Whooping Cranes normally migrate as a single, pair, family group, or in small flocks, sometimes accompanying Sandhill Cranes. Flocks of up to 10 subadults have been observed feeding at stopover areas. Whooping Cranes migrate during the day, and make regular stops to feed and rest. Although they use a variety of habitats during migration, they prefer isolated areas away from human disturbance.

Whooping Cranes arrive on the Texas coast between late-October and mid-November. They spend almost 6 months on the wintering grounds at and near Aransas NWR. Pairs and family groups generally occupy and defend discrete territories, although close association with other Whooping Cranes is sometimes tolerated. Juveniles stay close to their parents throughout their first winter. Recent estimates of territory size average 292 acres. Studies indicate a declining territory size as the wintering population increases. Subadults and unpaired adults form small flocks and use areas outside occupied territories. Subadult birds often spend the winter near the territories where they spent their first year. Also, young adult pairs will often locate their first territory near the winter territory of one of their parents.

During the wintering period on the Texas coast, Whooping Cranes eat a variety of plant and animal foods. Blue crabs, clams, and the fruits of wolfberry are predominant in the winter diet. Clams are relatively more important in the diet when water depths are low and blue crabs are less abundant. Most clams and small blue crabs (2 inches or less in width) are swallowed whole. Larger crabs are pecked into pieces before being swallowed.

Whooping Cranes feed mostly in the brackish bays, marshes, and salt flats. Occasionally, they fly to upland sites for foods such as acorns, snails, crayfish, and insects, returning to the marshes in the evening to roost. Upland sites are more attractive when they are flooded by rainfall, burned to reduce plant cover, or when food is less available in the marshes and salt flats. Some Whooping Cranes use the upland parts of the refuge frequently in most years, but use of croplands adjacent to the refuge is rare.

As spring approaches, the courtship displays for which Whooping Cranes are famous begin. These displays include loud unison calling, wing flapping, head bowing, and leaps into the air by one or both birds, increase in frequency. These rituals serve to forge and strengthen pair bonds, and indicate that the birds will soon leave for the breeding grounds. Family groups and pairs usually depart first, normally between March 25 and April 15. The last birds are usually gone by May 1, but occasional stragglers may stay into mid-May. During the 16-year period between 1938 and 1992, a total of 27 birds have remained at Aransas NWR throughout the summer. Many of these birds were ill or crippled or mates of birds which were crippled.

Parents separate from their young of the previous year at the beginning of spring migration, while in route to the breeding grounds, or soon after arrival on the breeding grounds. Most juveniles spend the summer near the area where they were born.

Threats and Reasons for Decline

Whooping Cranes gradually disappeared as agriculture claimed the northern Great Plains of the United States and Canada. Man's conversion of the native prairies and potholes to pasture and crop production made much of the original habitat unsuitable for Whooping Cranes. Rural electrification brought powerlines, resulting in an increase in death and serious injury due to collisions.

Human disturbance has also played a role in the decline of the Whooping Crane. The birds are wary on the breeding grounds. They will tolerate human intrusion for short intervals, but will not remain near constant human activity. The mere presence of humans during settlement of the midcontinental and coastal prairies may have interfered with the continued use of traditional breeding habitat by Whooping Cranes.

The Aransas population, the only population that is self-sustaining, remains vulnerable to accidental spills that could occur along the Gulf Intracoastal Waterway. The Intracoastal Waterway carries some of the heaviest barge traffic of any waterway in the world, and it runs right through the center of the Whooping Crane winter range. Much of the cargo is petrochemical products. Although spill response plans have been developed, an accident resulting in a spill could potentially destroy Whooping Cranes or their food resources.

Records of Whooping Cranes known to have died from gunshot or other causes from colonial times to 1948, show that about 66 percent of the losses occurred during migration. Shooting represented a substantial drain on the population, particularly from 1870 to 1920. Large and conspicuous, Whooping Cranes were shot for both meat and sport. Laws enacted to protect the birds have led to a decline in human caused mortality, but shootings still occur. The most recent known cases involved an adult female being mistaken for a snow goose near Aransas NWR in 1989, and an adult female shot by a vandal as she migrated northward through Texas in 1991.

Biological factors such as delayed sexual maturity and small clutch size prevent rapid population recovery. The major population of Whooping Cranes is now restricted to breeding grounds in northern Canada. This hampers productivity because the ice-free season is only 4 months, barely enough time to incubate their eggs for 29-31 days and rear their chicks to flight age in the remaining 3 months. Unless nest loss occurs early in the incubation period, there is rarely time to successfully rear a second clutch if the first clutch fails.

Drought during the breeding season presents a serious hazard because nest site availability and food supplies are reduced and newly hatched chicks are forced to travel long distances between wetlands. Drought also increases the exposure of eggs and chicks to predators such as ravens, bears, wolverines, foxes, and wolves.

Although little is known about the importance of disease and parasites as mortality factors, there have been documented cases of Whooping Cranes dying of avian tuberculosis, avian cholera, and lead poisoning. Coccidia, a parasite which causes digestive tract disorder, has also been found in wild and captive birds.

Finally, Whooping Cranes are exposed to a variety of hazards and problems during their long migrations. Natural events such as snow, hail storms, low temperatures, and drought can make navigation hazardous or reduce food supplies. Collision with utility lines, predators, disease, and illegal shooting are other hazards that affect migrating cranes.

Recovery Efforts

The comeback story of the Whooping Crane has been heralded as one of the conservation victories of the 20th Century. The increase and stabilization of the Aransas/Wood Buffalo population has been a result of many factors, including legal protection, habitat protection, and biological research in both the United States and Canada.

In 1975, the U.S. Fish and Wildlife Service initiated a migration monitoring program to protect migrating Whooping Cranes from disease outbreaks and other potential hazards, and to compile information on the characteristics of stopover sites. This monitoring program is now coordinated with a network of people from the Canadian Wildlife Service, States, and Provinces along the migration corridor.

Flightless young Whooping Cranes were captured and marked with colored plastic legbands in Wood Buffalo National Park (NP) from 1977 through 1988. Of the 133 birds banded, 37 percent could still be identified in the spring of 1994. This marking program has provided a wealth of information on Whooping Crane biology. A radio tracking program, in which miniature radio transmitters were attached to the color legbands of young Whooping Cranes banded at Wood Buffalo NP, has also yielded valuable information concerning migration timing and routes, stopover locations, habitat use, social behavior, daily activity, and causes of death. Recently, tests of line marking devices have identified techniques effective in reducing collisions with utility lines.

Oil spills are potential thr

The wintering territories of Whooping Cranes on the Texas coast place the birds in close proximity to human disturbance factors such as tour boats, boat and barge traffic along the Intracoastal Waterway, recreational and commercial fishing boats, and air traffic. A number of recent and ongoing studies have addressed the issue of how human disturbance factors might affect wintering birds. Additional research studies currently underway include evaluating human and wildlife competition for principal crane foods, and determining the nutritive composition of winter foods. Significant habitat research has also been conducted on the nesting grounds in Canada.

Prescribed burning is used on Aransas NWR to reduce height and density of grasses, topkill brush, and to modify plant composition on the uplands to make them more attractive to Whooping Cranes. Burned areas are immediately used by the birds. Currently, 10 prescribed burning units averaging 1,410 acres in size are burned on a 3 year rotation.

The most complete count of the Aransas/Wood Buffalo population is made during the winter. Aerial counts are made weekly throughout the winter period, although counts are made less frequently during mid-winter. These flights provide information on mortality, habitat use, pair formation, territory establishment, and age structure by identifying all color banded birds present. Additional protection of habitat outside Aransas NWR is provided by the National Audubon Society, which leases several offshore islands from the State of Texas. Monitoring of nesting pairs also takes place at Wood Buffalo NP.

osion control efforts along the Intracoastal aterway at Aransas National Wildlife Refuge
TPWD

Construction of the Gulf Intracoastal Waterway through the marshes of Aransas NWR in the early 1940's, and subsequent erosion by wind and boat wakes, has resulted in 11 percent loss of wintering habitat. Between 1989 and 1992, volunteers placed over 57,000 sacks of cement to protect 8,752 feet of shoreline. In 1992, the Corps of Engineers placed 2,013 feet of interlocking cement mats to stop erosion. They plan to armor an additional 14,000 feet of eroding shoreline in 1993 and 1994, and 2,000 feet each year thereafter until all areas are adequately protected.

Dredged material deposited from periodic maintenance of the Intracoastal Waterway has destroyed some marsh areas and unintentionally created others. In 1991, Mitchell Energy and Development Corporation built a dike around 10 acres of open shallow bay, filled the area with dredge spoil, and planted it to wetland vegetation. Whooping Cranes began using the area the following winter. In 1993, Mitchell Energy built 8 more acres of marsh adjacent to the first area. The Corps of Engineers is also currently evaluating beneficial uses of dredge spoil to create coastal marsh habitat for Whooping Cranes. In 1993, they created nearly 50 acres of marsh.

Several efforts have been initiated to establish new populations of Whooping Cranes as a means of safeguarding the species against a catastrophe in the Aransas/Wood Buffalo population. The effort in Idaho used sandhill cranes as foster parents to incubate Whooping Crane eggs, raise the chicks, and teach them migration paths to New Mexico. Foster-parenting has proved to be an unsuitable technique, however, as imprinting led to problems for the whoopers in establishing pair bonds. An effort in Florida is using techniques developed successfully with the endangered Mississippi Sandhill Crane to try to establish a non-migratory flock of Whooping Cranes. Meanwhile, new techniques for establishing a second migratory population continue to be explored. Several new techniques, such as finding appropriate migration routes through satellite telemetry of sandhill cranes, rearing young whoopers in captivity using humans costumed as Whooping Cranes, and teaching migration using ultralight aircraft hold significant promise.

These reintroduction efforts have been made possible by a successful captive breeding program for Whooping Cranes. Although whoopers at Wood Buffalo lay two eggs, usually only one hatches. Since 1967, biologists from the United States and Canada have collected eggs from wild nests in order to establish captive populations and support reintroduction efforts. Three captive breeding facilities exist, including Patuxent Wildlife Research Center in Maryland, the International Crane Foundation in Wisconsin, and Calgary Zoo in Alberta, Canada.

Finally, there is much evidence that people value Whooping Cranes. Numerous books, magazines articles, television programs, and nature documentary films have been produced about this magnificent bird. Each year 70,000 to 80,000 people visit Aransas NWR, most during the winter. These visitors spend a significant amount of money locally on lodging, gasoline, and supplies. In 1990, five tour boats offered trips to view Whooping Cranes along the Gulf Intracoastal Waterway. During 1990-91, approximately 17,000 people took these tours, paying an average of $20 per ticket, for a total seasonal amount of $340,000. The city of Rockport estimates that wildlife-related activities result in annual gross economic benefits of $6 million to the local economy. Some of these benefits result from the nearby presence of Whooping Cranes. The possibility of sighting Whooping Cranes, along with large numbers of migrating sandhill cranes, is an additional attraction to tourists in other areas of the United States. For example, approximately 80,000 people visit the Platte River area of Nebraska each year during the peak of spring crane migrations, spending approximately $15 million. The Chamber of Commerce of Grand Island, Nebraska has responded by sponsoring an annual festival, "Wings over the Platte," to further promote this interest in birds.

Where To See Whooping Cranes

Visit Aransas National Wildlife Refuge near Austwell, Texas during November through March to see Whooping Cranes as well as migratory waterfowl and other wildlife. As mentioned above, there are a number of commercially operated boat tours, departing from the Rockport/Fulton area, which offer visitors the chance for a close look at Whooping Cranes, waterfowl, shorebirds, herons, and hawks. Contact Aransas NWR at (512) 286-3559 or the Rockport Chamber of Commerce at (800) 242-0071 for more information. Also, the San Antonio Zoo exhibits captive Whooping Cranes as part of the recovery effort.

How You Can Help

Whooping Cranes migrate over north and east-central Texas on their way to and from Aransas NWR each fall and spring. The birds are particularly vulnerable to human disturbance and other hazards during this migration period. They sometimes stop in fields or wetlands near rivers or lakes to feed or rest. If you see migrating Whooping Cranes, view them from a distance and be careful not to disturb them. Report sightings to the Texas Parks and Wildlife Department or the U.S. Fish and Wildlife Service. Remember that harassing, shooting, or attempting to capture a Whooping Crane is a violation of Federal Law. If you find a dead or injured bird, report it immediately to one of the numbers listed below or to your local game warden. Since injured Whooping Cranes are delicate and require special care, you should quickly contact a representative of Texas Parks and Wildlife or U.S. Fish and Wildlife and carefully follow their instructions.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) Field Offices, most State Parks, and the License Branch of TPWD headquarters in Austin. Part of the proceeds from the sale of these items are used to conserve habitat and provide information concerning rare and endangered species. Conservation organizations such as the Whooping Crane Conservation Association, National Audubon Society, International Crane Foundation, and The Nature Conservancy of Texas also welcome your participation and support.

For More Information Contact

Texas Parks and Wildlife Department
Endangered Resources Branch
4200 Smith School Road
Austin, Texas 78744
(512) 912-7011 or (800) 792-1112
or
U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057
or
Aransas National Wildlife Refuge
P.O. Box 100
Austwell, Texas 77950
(512) 286-3559

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Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

STATUS: Endangered (53 FR 38460-September 30, 1988) without critical habitat.

DESCRIPTION: Differs from most other U.S. bats in having an elongated muzzle with a small nose leaf at the tip. Total head and body length from 2 3/4 to 3 3/4 inches. Weight is 1/2 to 1 ounce, tongue measures up to 3 inches, tail is very small. Usually yellowish-brown or grayish above, and cinnamon brown below. Distinguished from the Lesser long-nosed bat by the longer, finer hair extending above and beyond the tail membrane, and its slightly larger size.

HABITAT: In northern parts of its range, found in high, desert scrub vegetation dotted with century plants (*Agave sp.*), mesquite, creosotebush, and cacti. Also documented from arroyo-mesquite acacia, lechuguilla-creosotebush-cactus, deciduous woodland, pinyon-juniper-oak woodland, and cypress-pine-oak associations. Day roosts seem to be limited to the entrances (twilight zone) of caves and mine tunnels.

DISTRIBUTION:

Present: From Big Bend National Park (Brewster County, Texas)and Hildalgo County, New Mexico in U.S., southward through Central Mexico.

Historic: New Mexico and Texas (Brewster and Presidio counties), and Mexico.

THREATS AND/OR REASONS FOR DECLINE: Roosting site disturbance, loss of food sources (mainly *Agave* plants) from exploitation by humans, and direct killing by humans.

OTHER INFORMATION: The Mexican Long-nosed Bat Recovery Plan was approved in 1994 and is being implemented. The species is migratory and is found in the United States only from June to August. Has a mutualistic relationship with *Agave* plants (plant's pollen and nectar provide food for bat; bat cross-pollinates the plant). May travel 30 to 40 miles per night searching for food. Plays a role in the cave ecosystem, providing the basis for a complex web of micro- and macro-organisms. The estimated population of this colonial, cave-dwelling species has declined in the U.S. from 10,650 in 1967 to 5,000 in 1991.

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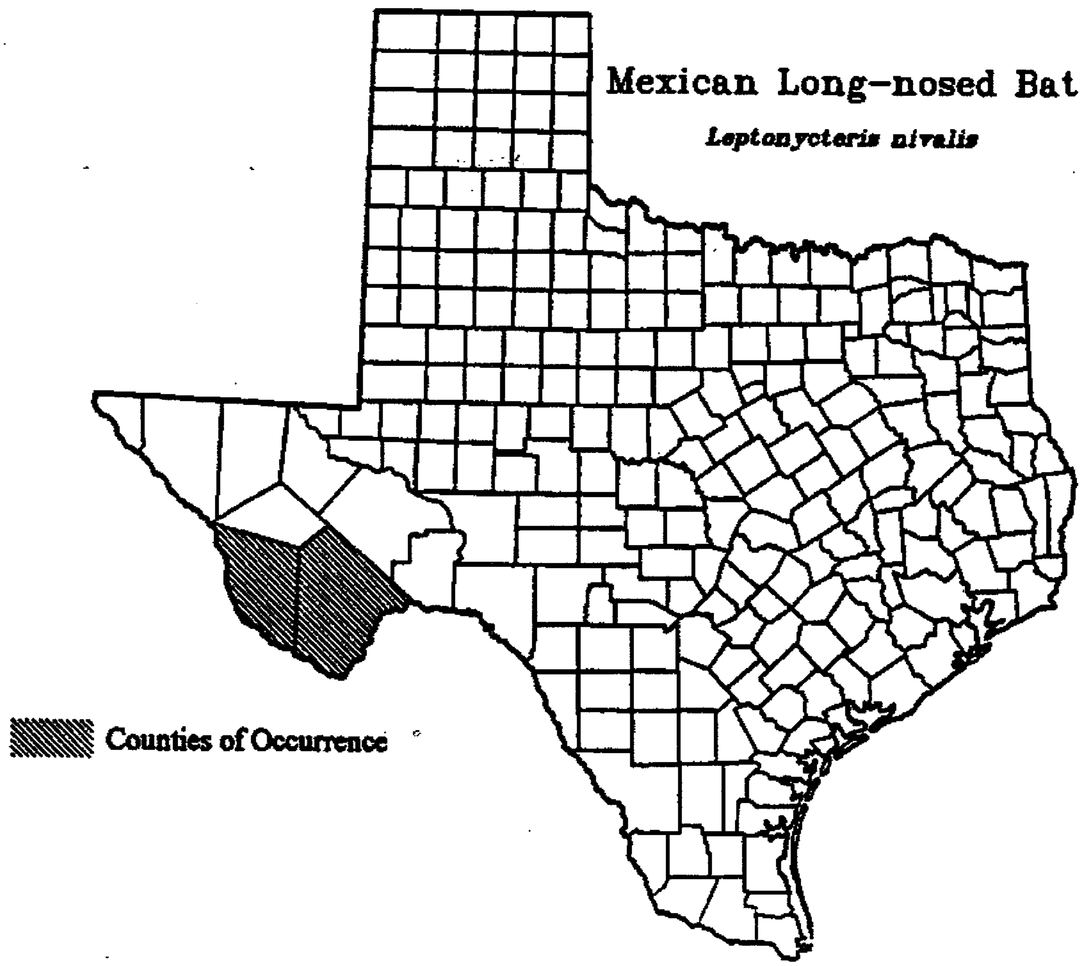


Map only shows Texas range

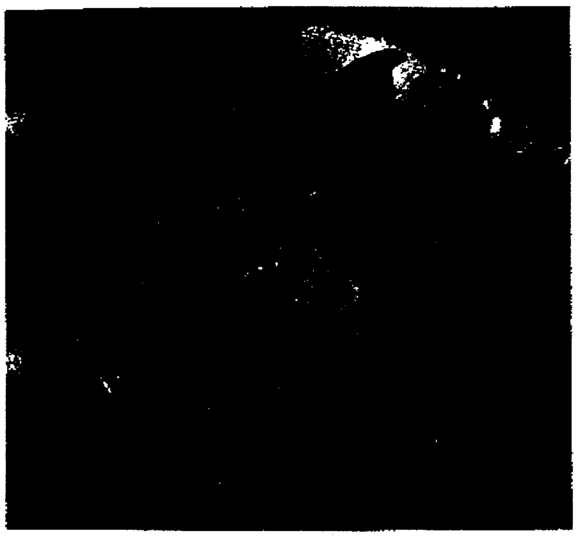
Greater Long-nosed Bat

Scientific Name: *Leptonycteris nivalis*

Federal Status: Endangered, 9/30/88 • State Status: Endangered

Description

The Greater or Mexican Long-nosed Bat is a relatively large bat compared with most U.S. bat species. It measures about 2 3/4 to 3 3/4 inches in total length, can be dark gray to "sooty" brown in color, and has a long muzzle with a prominent nose leaf at the tip. Its long tongue, an adaptation for feeding on flower nectar, can be extended up to 3 inches and has hair-like papillae on its tip. It has a minute tail that may appear to be lacking.



Greater Long-nosed Bat
© Merlin D. Tuttle

Distribution and Habitat

The Greater Long-nosed Bat has been found in southwestern New Mexico, the Big Bend area of Texas, the Chinati Mountains of Presidio County, Texas and southward to central Mexico. The species was first discovered in the United States in 1937 in a cave in the Chisos Mountains of Big Bend National Park. In Texas and northern Mexico, at the northern part of their range, these bats are found in desert scrub vegetation dotted with century plants (agaves), mesquite, creosotebush, and a variety of cacti. In Big Bend National Park, long-nosed bats are associated with five distinct vegetation types at various elevations. These include the arroyo-mesquite-acacia (1800-4000 ft.), lechuguilla-creosotebush-cactus (1800-3500 ft.), deciduous woodland (3700-7800 ft.), pinyon-juniper-oak woodland (3700-7800 ft.), and cypress-pine-oak (5800-7200 ft.).

For day roosting sites, Greater Long-nosed Bats depend on caves, crevices, abandoned mines, tunnels, and old buildings. These highly colonial bats are frequently found near the entrances of caves and other roosts, in the twilight zones. The bats often occupy the same roosts from year to year. In the United States, thousands of individuals may roost together at a single site, although large aggregations are more uncommon today than in the past.

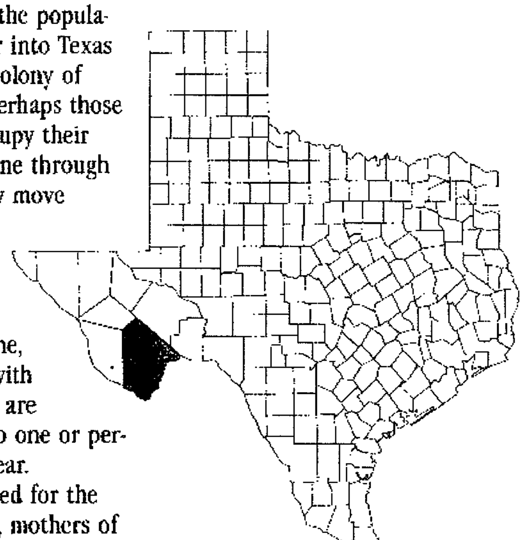
Life History

Although movement patterns are not well known, Greater Long-nosed Bats are thought to move from central Mexico into northern Mexico each year, with part of the population crossing the border into Texas and New Mexico. The colony of bats at Big Bend, and perhaps those in northern Mexico, occupy their northern roosts from June through August, after which they move south to winter in central Mexico.

The young are born in Mexico during April, May and early June, then move northward with their mothers. Females are believed to give birth to one or perhaps two young each year. Although not documented for the Greater Long-nosed Bat, mothers of other bat species recognize their own young by a combination of smell and distress cries made by their offspring. Young bats nurse for about one month and are generally capable of flying by five weeks of age. Few adult males have been recorded in Texas, suggesting that males and females may segregate geographically, with males rarely appearing in the most northerly part of the species' range.

The feeding ecology of the Greater Long-nosed Bat is of great importance in understanding its life history and recent decline. These bats are nectar feeders, emerging at night to feed on the showy flowers of plants such as agave or century plants (*Agave* spp.). They are very strong, highly maneuverable fliers, and like hummingbirds, are able to hover in flight while they feed. A mutual relationship exists, with the bats depending on the plants for food, and the plants benefitting from the bats as pollinators.

Agaves flower by sending up a green stalk supporting numerous flower clusters that produce large quantities of nectar each night. Besides consuming the nectar, the bats also ingest pollen, picked up inadvertently on their fur as they feed and later ingested during grooming. The pollen provides vitamins and minerals and is rich in protein. Agave nectar is 17-22% sugar, and the pollen is about 20% protein.



The Greater Long-nosed Bat and a similar species, the Lesser Long-nosed Bat (*Leptonycteris curasoae*), are the main pollinators of several agave species, including *Agave angustifolia* (mezcal plant), *A. salmiana* (pulque plant), and *A. tequilana* (tequila plant). The Greater Long-nosed Bat prefers higher and cooler places in parts of New Mexico, Texas, and Mexico;

whereas, the Lesser Long-nosed Bat generally inhabits lower elevations in New Mexico, Arizona, Mexico, and parts of Central and South America. In some areas, the two species are found together.

Greater Long-nosed Bats, with their long muzzles and tongues, are well adapted to feeding on nectar and protein-rich pollen. Adapted for specialized feeding, they migrate to follow the bloom periods of a number of plant species. In Big Bend National Park, agaves begin blooming in mid-May at lower elevations and early June at higher altitudes. The bats arrive in Texas about one month after flowering of agaves has begun. After spending most of the summer in Big Bend, they leave the United States in late summer or early fall as the agaves go out of bloom. They follow later-blooming agaves southward through Mexico. By November, they are several hundred miles into Mexico, where they feed on the blooms of subtropical trees and cacti. They spend the winter in the lush Central Valley of Mexico, feeding on a large variety of flowers. In the spring, they work their way back north, following the bloom times of various cacti and agaves.

Threats and Reasons for Decline

Although the Greater Long-nosed Bat occurs throughout much of Mexico, there are indications of substantial population decline both in the United States and Mexico. The population at the only known roosting site in the United States, a cave in Big Bend National Park, fluctuates widely in numbers from one year to the next. Yearly estimates of population size range from zero to as many as 10,650 individuals. Reasons for these fluctuations are unknown, but some scientists believe that the colony forms in years when overpopulation or low food supply in Mexico forces the bats to move northward. However, even considering natural fluctuations and different methods of estimating numbers, there still appears to be a downward trend in the numbers of bats at the Big Bend colony.

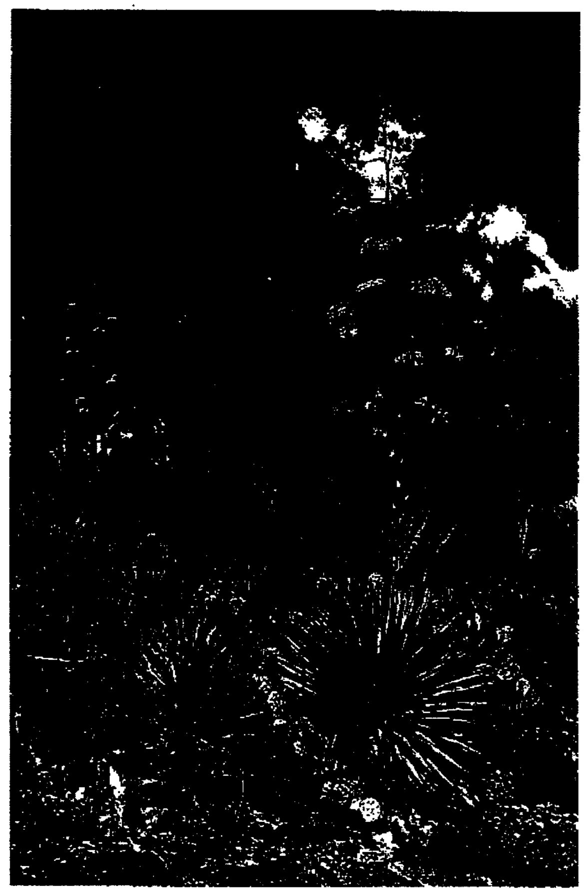
Population declines in Mexico have also been documented. An abandoned mine in Nuevo Leon, Mexico, which had an estimated population of 10,000 Greater Long-nosed Bats in 1938, had no sign of the species in 1983. Another mine in Nuevo Leon had a ceiling covered with newborn bats in 1967, but only one bat was found in 1983. Considering this information, the U.S. Fish and Wildlife Service added this bat, along with its close relative the Lesser Long-nosed Bat, to the list of endangered species in 1988.

The reasons for these population declines are not entirely understood, but are thought to be associated with loss of roosting sites and food sources. Colonial roosting species, such as many bats, are particularly vulnerable to disturbance and destruction of roosting habitat, since this can result in the displacement of large numbers of animals at one time. Also, only a limited number of caves, mines, and other roost sites provide the proper roosting environment (temperature and humidity). While the roost site in the United States is protected within Big Bend National Park, the bats spend most of the year in Mexico, where human disturbance and destruction of roost sites is a common occurrence. In Mexico, a country with 137 species of bats, there are few laws protecting bats or their roosts. However, in May of 1991 the Mexican government listed three bat species (*Choeronycteris mexicana*, *Leptonycteris nivalis*, and *L. curasoae*) as endangered. In addition, two bat caves are proposed for protection by the State of Tamaulipas.

In tropical Mexico where vampire bats are a problem, ranchers and the public often consider all bats to be vampire bats, which sometimes spread diseases to livestock and people. Thus, destructive control practices targeted for vampire bats often kill beneficial species.

Loss of food sources may be another threat contributing to the decline of the Greater Long-nosed Bat. Agaves are an important food source, and are the primary blooming plants available in northern Mexico during their northern migration in the spring, and again in August when they move south. Harvest of agaves for the production of liquor, and in northeastern Mexico, for preparation of "quiote," a traditional sweet, may be contributing to the decline of this important food source. However, the extent to which these harvest activites affect the bats is unknown.

Agave plants are harvested just before they bloom by removing the "cabeza" or carbohydrate-rich meristem (actively growing tissue) and



Agave plants in bloom
© Merlin D. Tuttle

leaf base at the center of the plants. When agaves are harvested, not only are they removed from the bats' present food supply, but future generations of agave plants also are eliminated. This is especially critical, since a single plant grows for 30 to 40 years and flowers only once, then dies.

Finally, the loss of agave plants due to clearing of rangeland areas in northern Mexico may also reduce the food supply and thus affect bat populations. Again, the degree to which these activities affect the bats is unknown.

Recovery Efforts

Research is currently underway to better understand the life history, habitat requirements, limiting factors, and management practices affecting the Greater Long-nosed Bat and the plants which provide their food. Efforts by scientists to locate roosting sites are currently being initiated in Mexico. Periodic surveys are conducted to assess population status at the only known roosting cave in the United States, located in Big Bend National Park.

How You Can Help

If you enter a cave or other place where bats are present, be aware that these mammals are very sensitive to human disturbances. Maternity colonies and hibernating bats should be avoided, since even slight disturbances can be harmful. It is best to leave the area immediately. Viewing of bats is best done by waiting outside the roost site until the bats emerge to feed in the evening. Also, because the Greater Long-nosed Bat depends on agave plants for its food, do not cut or otherwise disturb these plants.

You can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps are available at Texas Parks and Wildlife Department (TPWD) field offices, most state parks, and the License Branch of TPWD headquarters in Austin. Part of the proceeds from these sales are used to protect habitat and provide information concerning endangered species.

Visit a Texas bat emergence on a Conservation Passport tour. Conservation Passports, available from TPWD, are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas. You can help by supporting bat conservation efforts in the United States and in Mexico. Conservation organizations in Texas also welcome your participation and support.

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Endangered Resources Branch
4200 Smith School Road
Austin, Texas 78744
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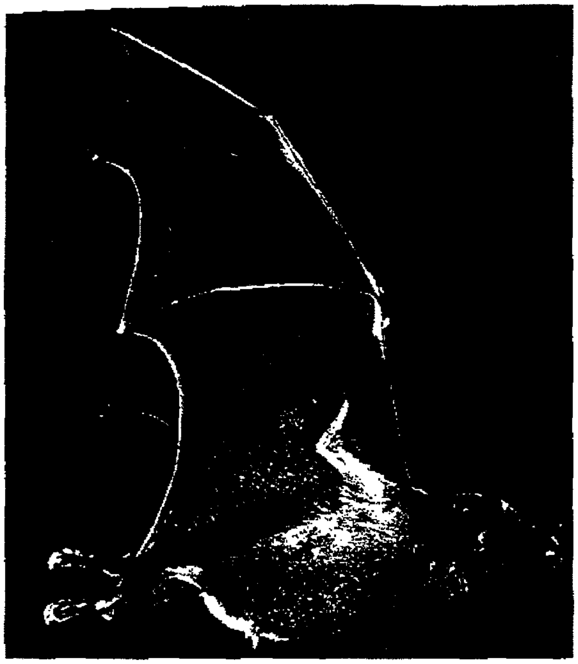
U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057



Greater Long-nosed Bat in flight
© Merlin D. Tuttle

Recovery efforts also include providing information to the general public and school children concerning the great diversity and importance of bats. Education campaigns are also underway in Mexico to provide information to the public concerning management of vampire bats.

Where To Learn More About the Greater Long-nosed Bat

Visit Big Bend National Park to learn more about the Greater Long-nosed Bat and its habitat. Read about Texas bats in *The Bats of Texas* by David Schmidly. Bat Conservation International, a non-profit organization located in Austin, can provide additional information on Texas bats.

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Black-capped Vireo

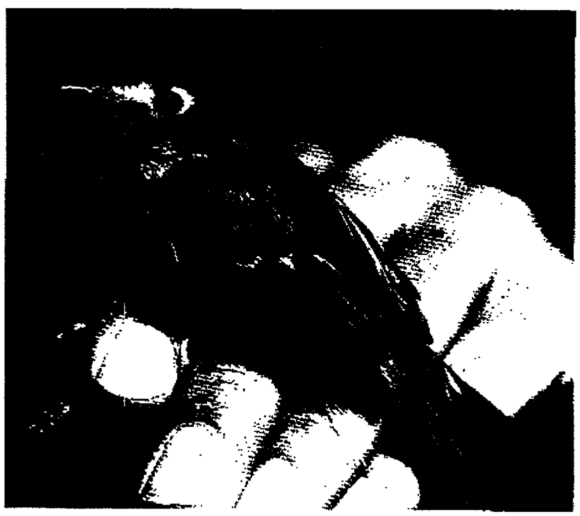
Scientific Name: *Vireo atricapillus*

Federal Status: Endangered, 10/6/87 • State Status: Endangered

Description

The Black-capped Vireo is a 4.5 inch insect-eating songbird. Mature males are olive green above and white below with faint greenish-yellow flanks. The crown and upper half of the head is black with a partial white eye-ring. The iris is brownish-red and the bill black. The plumage of the female is duller than the male. Females have a dark slate gray head.

Male Black-capped Vireo
© TPWD



Female Black-capped Vireo
© USFWS A. Shull

Distribution and Habitat

Historical records from 1852-1956 show that the Black-capped Vireo once occurred from central Kansas, Oklahoma, Texas and into Mexico. These records show that vireos bred in Kansas, Oklahoma, Texas, and central Coahuila, Mexico. Today, Black-capped Vireos breed locally in central Texas, a few counties in central Oklahoma, and central Coahuila, Mexico, although little is known of their status in Mexico. Black-capped Vireos winter along the western coast of Mexico.

In Texas, vireo habitat is found on rocky limestone soils of the Edwards Plateau, Cross Timbers and Prairies, eastern Trans-Pecos and, to a limited extent, on igneous soils in the Chisos Mountains. Although Black-capped Vireo habitat throughout Texas is highly variable with regard to plant species, soils, temperature, and rainfall, all habitat types are similar in vegetation structure; i.e. the "overall look" is somewhat similar although the plant species vary. Vireos require shrub vegetation reaching to ground level for nesting cover. They typically nest in shrublands and open woodlands with a distinctive patchy structure. Typical habitat is characterized by shrub vegetation extending from the ground to about 6 feet and covering about 30 to 60 percent or greater of the total area. In the eastern portion of the vireo's range, the shrub layer is often combined with an open, sparse to moderate tree canopy. Open grassland separates the clumps of shrubs and trees.

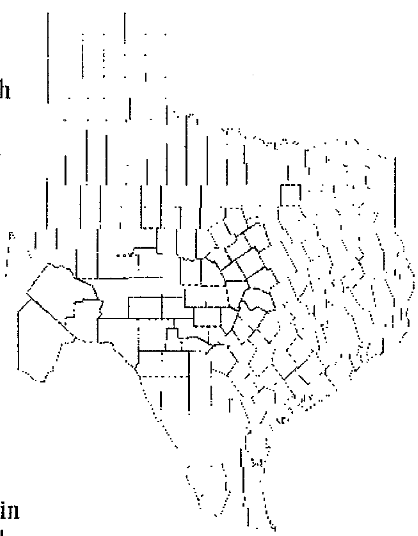
In the Edwards Plateau and Cross Timbers Regions, vireo habitat occurs where soils, topography, and land use produce scattered hardwoods with abundant low cover. Common broad-leaved plants in vireo habitat include: Texas (Spanish) oak, Lacey oak, shin oak, Durand (scaleybark) oak, live oak, mountain laurel, evergreen sumac, skunkbush sumac, flameleaf sumac, redbud, Texas persimmon, mesquite, and agarita. Although Ashe juniper is often part of the plant composition in vireo habitat, preferred areas usually have a low density and cover of juniper.

In the western Edwards Plateau and Trans-Pecos Regions, on the western edge of the vireo's range, the birds are often found in canyon bottoms and slopes where sufficient moisture is available to support diverse shrub vegetation. Dominant woody plants in this habitat type include sandpaper oak, vasey shin oak, Texas kidneywood, Mexican walnut, and fragrant ash, mountain laurel, and guajillo.

For all habitat types, the plant composition appears to be less important than the presence of adequate broad-leaved shrubs, foliage to ground level, and mixture of open grassland and woody cover. Deciduous and broad-leaved shrubs and trees throughout the vireo's range are also important in providing habitat for insects on which the vireo feeds.

Life History

Black-capped Vireos arrive in Texas from mid-March to mid-April. Adult males often arrive before females and first-year males to select their territories. Vireos' territories are



often clustered in patches of suitable habitat. Although territories range in size from 1 to 16 acres, most territories are 2 to 4 acres. Males sing to attract mates and defend territories. Many males can be heard singing throughout the breeding season, but singing begins to decline by July. The vireo's song is described as hurried and harsh, composed of various phrases and syllables with a restless quality.

Nesting begins after the females arrive in late March to early April. Both the male and female select the nest site, and the female completes the nest. Nest building usually requires 2 to 3 days. The cup-shaped nest is suspended from its rim in a fork of a branch about 1 to 6 feet above the ground. However, most Black-capped Vireos nest at about "doorknob" height. Nests have been found in shin oak, scalybark oak, Texas oak, sumac, Texas persimmon, juniper, and Texas mountain laurel.

The vireo may nest more than once in the same year. A new nest is constructed each time. Three to four eggs are usually laid in the first nesting attempt, but later clutches may contain only 2 to 3 eggs. The first egg is usually laid one day after completion of the nest, with one egg being laid each subsequent day. Incubation takes 14 to 17 days, and is shared by the male and female.

Vireo chicks are fed by both adults. The young fledge (leave the nest) 10 to 12 days after hatching. Fledglings are cared for by the female alone, the male alone, or by both adults. Sometimes the parents split the brood and each care for several young. Occasionally, males or females will leave the care of the young to their mate, and attempt another nesting effort.

Vireos may live for more than five years, and usually return year after year to the same territory, or one nearby. The birds migrate to their wintering grounds on Mexico's western coast beginning in July, and are gone from Texas by mid-September.

Threats and Reasons for Decline

The Black-capped Vireo is vulnerable to changes in the relative abundance of its habitat. For any given site, good vireo habitat may become unsuitable because of natural plant succession or because of human activities. Active, well-planned land management is often required to maintain good vireo habitat, especially in the eastern portion of its range. Factors that can adversely affect vireo habitat include broad-scale or improper brush clearing, fire suppression, overbrowsing by deer and livestock, and urbanization. Loss of tropical wintering habitat is also a concern.

Poorly planned brush management practices on rangeland may remove too much low growing woody cover, especially when large acreages are treated at one time. This eliminates or reduces habitat value for vireos and for other wildlife, such as White-tailed deer, quail, small mammals, and various songbirds. Overbrowsing of broad-leaved shrubs by goats, deer, and exotic animals reduces the vegetation in the 2 to 4 foot zone, making it unsuitable for vireo nesting. Continued overuse of these preferred browse plants over many years may eventually eliminate them from the plant community, thus permanently altering the habitat.

The role of fire in maintaining, improving, or creating vireo habitat is also an important consideration. The rangelands of central Texas, and the various plant communities these lands support, evolved under the influence of periodic fires. Historically, these natural and man-made fires maintained an open grassland with scattered clumps of trees and shrubs. Fire stimulated shrubs to sprout at the base, thus providing areas of dense foliage at the 2 to 4 foot level, required by vireos. In the past, fire was responsible for maintaining or periodically returning some areas to vireo habitat. Today, prescribed burning, a valuable range and wildlife management tool, occurs on many ranches throughout Texas. However, the combination of overgrazing and lack of fire in the recent past has reduced vireo habitat in many other areas.

Human activities have provided favorable habitat for the Brown-headed Cowbird, which parasitizes vireo nests. The cowbird is usually associated with livestock, farms,

Black-capped Vireo nest
© TPWD Glen Mills

Nesting vireo
© Greg W. Lasley

and grain fields, where it benefits from waste grain and insects. They may also be attracted to backyard bird feeders, trash dumps, or other urban areas where food and water are available. Cowbirds lay their eggs in other birds' nests, leaving the host bird to raise their young. A cowbird chick can expel or out-compete the host birds' eggs and young, leaving only the cowbird chick to be fed by the host. While some birds remove cowbird eggs from their nest, the vireo does not. When nest parasitism occurs, vireos tend to abandon their nest, and thus parasitized nests usually fail to produce vireos. When their nest is parasitized, vireos often attempt to renest. The amount of nest parasitism varies greatly from one population to another throughout the

Habitat at Kickapoo Caverns State Park
© Matt Wagner

Habitat with low-growing shrubs
© Matt Wagner

Habitat in Big Bend National Park
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state, ranging from 10 to 90 percent of the nests.

Direct habitat loss and fragmentation due to urban and suburban development is a major threat in expanding urban areas of Travis, McLennan, Dallas, Bexar, and Kerr counties. Problems associated with suburban expansion, such as increases in predation by dogs, cats, raccoons, skunks, and jays, have also impacted the vireo.

In summary, protection and proper management of known vireo nesting areas, management for large patches of quality habitat, and reduction of the problem of parasitism are essential to the protection of this species and other plant and animal species associated with the Black-capped Vireo in Texas.

Recovery Efforts

Research is underway to better understand the life history, habitat requirements, and land management practices affecting the Black-capped Vireo. Research is also in progress regarding the impact of cowbirds on vireo populations in Texas. Research efforts in Mexico are planned to gather information concerning life history and habitat requirements on the wintering range.

Habitat conservation planning is underway in counties such as Travis and Bexar to direct urban expansion and development away from endangered species habitat. Finally, efforts to provide information, technical assistance, and incentives for private landowners to incorporate management for Black-capped Vireos into their livestock and wildlife operations are an essential part of the recovery process.

Where To See the Black-capped Vireo

A number of state lands offer opportunities to see and learn more about the Black-capped Vireo. These include Black Gap Wildlife Management Area (WMA), Colorado Bend State Park (SP), Devils River State Natural Area (SNA), Dinosaur Valley SP, Kerr WMA, Kickapoo Caverns SP, Lost Maples SNA, South Llano River SP, and Buck WMA. Also, once open to the public, the Balcones Canyonlands National Wildlife Refuge near Austin and Government Canyon State Park near San Antonio will offer additional opportunities to see Black-capped Vireos.

Because the Black-capped Vireo is an endangered species, birders and other observers should carefully follow certain viewing ethics. Observers should be careful not to flush birds from the nest or disturb nests or young. Black-capped Vireos should be viewed only from a distance with binoculars. Do not use recorded calls of the Black-capped Vireo or the Screech Owl to attract birds, and be careful that your presence does not unduly disturb or stress the birds.

How You Can Help

Landowners can help by learning more about the habitat requirements of the Black-capped Vireo and incorporating management practices which create or maintain habitat for these birds. You can also encourage and support private landowners who are managing their land to protect and provide habitat for endangered species.

You can be involved with the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) field offices, most state parks, and the License Branch of TPWD headquarters in Austin. Part of the proceeds from the sale of these items are used to conserve habitat and provide information to the public concerning endangered species. Conservation Passports, available from TPWD, are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas throughout Texas. Conservation organizations in Texas also welcome your participation and support.

For More Information Contact

Texas Parks and Wildlife Department
Endangered Resources Branch
4200 Smith School Road
Austin, Texas 78744
(512) 912-7011 or (800) 792-1112
or
U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057

Management guidelines are available from the Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service for landowners and managers wishing to know more about rangeland management practices which improve habitat for the Black-capped Vireo.

Cowbird egg (spotted) in Black-Capped Vireo nest
[illegible]

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Management Guidelines for Black-capped Vireo

The following guidelines address land management practices that can be used to maintain, enhance, or create Black-capped Vireo habitat. They are intended primarily to serve as general guidance for rural landowners and others managing land for livestock and/or wildlife in Texas. The guidelines are based on our current understanding of the biology of this species.

Prescribed Burning

Prescribed burning is an excellent tool used to maintain the desired vegetation structure for vireo nesting; i.e. a mosaic of shrubs and open grassland with abundant woody foliage below 6 feet. Cool season burns, conducted prior to March 15, are often recommended to control small juniper, thus maintaining the relatively open shrublands preferred by vireos. Prescribed burns conducted during late spring and early fall, under hotter conditions, can be used to set back plant succession in order to create vireo habitat; however, warm season burns should be done only in areas that do not currently support Black-capped Vireos. On grazed rangeland, prescribed burns should be coordinated with livestock rotation to allow for needed deferments. It is best to avoid burning relatively small areas within large pastures to prevent heavy grazing pressure by livestock and/or deer on burned areas.

Prescribed burning
© Matt Wagner

Selective handcutting of juniper
© TPWD Glen Mills

Desirable burn intervals for cool season burns vary throughout the state, depending on rainfall and vegetation type. Field experience shows that, for much of the Hill Country, a burning interval of 4 to 7 years is considered desirable to keep Ashe juniper (cedar) invasion in check and to allow regrowth of broad-leaved shrubs. Maintaining open grassland areas between clumps of shrubs is important for good vireo habitat. Research is needed to better understand the use of prescribed burning to maintain and create vireo habitat, and to develop guidelines on desirable burn intervals throughout the vireo's range in Texas.

Assistance from people experienced with the use of prescribed burning is highly recommended. Landowners are encouraged to have a complete written prescribed burn plan addressing the objectives of the burn, required weather conditions, grazing deferments, fireguard preparations, personnel and equipment needed, a detailed map showing how the burn will be conducted, and notification and safety procedures.

Fire is a natural component of Texas rangelands, and prescribed burning has many range and wildlife management benefits. These include improved forage quality and availability for livestock and deer, and maintenance of desirable plant composition and structure. Landowners are advised to contact local representatives of the Texas Parks and Wildlife Department, U.S. Natural Resources Conservation Service (formerly Soil Conservation Service), or Texas Agricultural Extension Service for help in developing and implementing a prescribed burning program designed specifically for your property and management objectives.

Selective Brush Management

Increases in juniper (cedar) and other woody species can easily cause the vegetation to grow (succeed) out of the patchy, low shrub cover that provides suitable habitat. In the eastern portion of the vireo's range, good nesting habitat generally has between 30 and 60 percent shrub canopy. Selective brush removal with herbicides or mechanical means can be used to keep the habitat favorable for vireo nesting. For example, the selective removal of juniper, mesquite, or pricklypear (less desirable to the vireo and to the rancher) serves to maintain a relatively open shrub canopy and encourages growth of associated broad-leaved shrubs. Selective brush removal should strive to maintain the low shrubby structure. Also, radical changes in shrub canopy from one year to the next over large areas should be avoided. Western Edwards Plateau rangelands comprised primarily of mesquite, often referred to as mesquite flats, are not considered Black-capped Vireo habitat; therefore, mesquite control in these areas will not affect vireos.

When using herbicides, careful attention to the kinds, amounts, timing, and application technique will achieve the best control of target species at minimum cost. Precise application also reduces the risk of environmental contamination and off-site effects. It is best to choose highly selective individual plant treatment methods, whenever practical, to avoid damage to desirable shrubs such as live oak, shin oak, Texas oak, hackberry, Texas persimmon, sumac, redbud, and elm. Herbicides should always be used in strict accordance with label directions, including those for proper storage and disposal of containers and rinse water. Herbicide applications should not occur during the breeding season, except for basal applications or individual plant treatment of prickly pear pads.

Handcutting or carefully planned mechanical methods of brush management such as chaining, roller chopping, or shredding can be used to stimulate basal sprouting of key woody species in order to maintain, enhance, or create vireo habitat. Mechanical methods should only be used during the non-breeding season (October-February). Remember that good grazing management and moderate stocking rates can reduce woody plant invasion and therefore the need for expensive brush control practices.

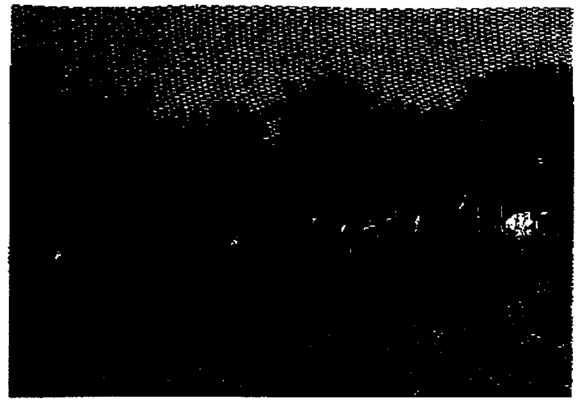
Finally, although brush management practices can be used to change the structure and composition of vegetation so that vireos may occupy the habitat, landowners should seek technical assistance when planning brush management practices in habitat that is known to be occupied by Black-capped Vireos. Since brush management activities can affect habitat for the Golden-cheeked Warbler as well as the Black-capped Vireo, landowners are encouraged to learn about the habitat requirements of both endangered songbirds (see leaflet on the Golden-cheeked Warbler).

Grazing and Browsing Management

Excessive browsing by goats, exotic animals, and White-tailed deer destroys the thick woody growth needed for nest concealment. Livestock and deer management, which allows woody plants such as live oak, shin oak, sumac, Texas persimmon, elbowbush, redbud, and hackberry to make dense growth from 0 to 6 feet, is needed. On ranches throughout Texas, moderate stocking, rotation of livestock, controlling deer numbers, and proper use of desirable browse plants will benefit deer and livestock as well as Black-capped Vireos.

To provide adequate nesting cover for vireos, woody plants should receive only limited browsing during the spring and summer. If animals (livestock, deer, and exotics) are well-managed and kept within recommended stocking rates, this can be achieved. Experience has shown that, in general, ranges stocked with cattle and deer tend to maintain better vireo nesting cover than ranges stocked with goats and exotic animals. Browsing surveys should pay more attention to stem growth than leaf growth, since leaf production in many shrubs varies widely, depending on season and weather conditions. Also, the amount of leaf production depends in part on the amount of stem and bud growth available on the plant. Research is lacking concerning how various levels of browsing pressure affect habitat structure and nesting use. However, based on field experience, a conservative approach would be to limit browsing pressure, especially during the growing season, to no more than 50% of the total annual growth (young, tender twigs) within reach of animals on any given plant. This will maintain plants that are already vigorous and allow for improvement of those with less than ideal structure. As a rule of thumb, if you can "see through" a browse plant, then too much stem and leaf growth has been removed.

Careful management of woody plants will not only provide for the habitat needs of Black-capped Vireos, but will also create high quality habitat for deer and other wildlife as well as livestock. Technical assistance in determining proper use of browse plants is available from the Texas Parks and Wildlife Department and U.S. Natural Resources Conservation Service.



Cattle rotation
TPWD

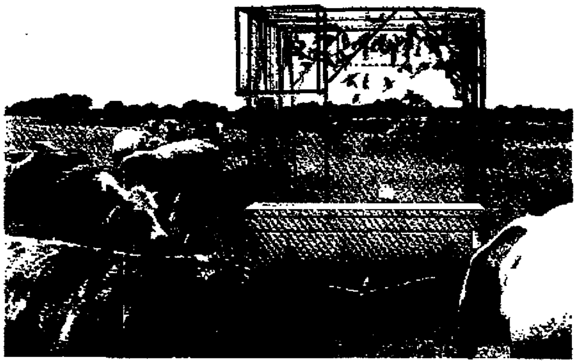
Overgrazed range with low-growing cover removed
TPWD

Reducing Impacts From Cowbirds

Brood parasitism by Brown-headed Cowbirds poses a serious threat to successful reproduction in some populations of Black-capped Vireos. Research is currently underway to better understand the impacts of cowbirds on vireos. Because cattle attract cowbirds, management to reduce cowbird impacts is important on grazed land.

Because cowbirds are attracted to easily available sources of food, avoid spilling or scattering grain. Supplemental feeding areas should be moved frequently and kept free from accumulations of waste grain. This would help to prevent sparsely vegetated areas of compacted soils, which also tend to attract cowbirds.

Grazing management can be used to remove cattle from areas where vireos nest. For example, cattle can be rotated away from prime nesting habitat during the breeding season. Another option is to graze stocker cattle during the fall and winter, resting pastures during the spring/summer nesting season. Resting pastures periodi-



Cowbird trap
© TPWD

cally improves range condition and may also help reduce nest parasitism.

Finally, trapping and/or shooting cowbirds can be effective in reducing vireo brood parasitism. Mounted mobile traps, placed near watering sites as livestock are rotated through pastures, have been used successfully to reduce cowbird numbers. Shooting cowbirds at places where they congregate is another option, although this method is often not selective for the cowbirds responsible for the parasitism. Contact Texas Parks and Wildlife Department or the U.S. Fish and Wildlife Service for assistance with implementing a cowbird control program for your property.

Habitat Restoration

For landowners wishing to restore or create habitat for the Black-capped Vireo in areas currently unoccupied by vireos, the following suggestions are offered. One type of restorable habitat is an open shrubland capable of growing a diversity of woody plants, where much of the low-growing cover has been removed through overbrowsing by livestock or deer. Controlling browsing pressure by reducing animal numbers and providing pasture rest will allow the natural reestablishment of low-growing shrub cover needed by vireos.

Habitat restoration may also be possible in areas where the shrub layer has become too tall or dense to provide good vireo habitat. In these areas, well-planned use of controlled fire can reduce overall shrub height, stimulate basal sprouting of shrubs, and reduce shrub density to produce more favorable habitat for vireos.

Also, in areas where the brush has become too dense, selective thinning could be done to produce a more open habitat. Carefully planned brush management could be used to encourage regeneration and lateral branching of desirable shrubs by allowing sunlight to reach the ground. In each of these examples, the idea is to restore areas that may once have provided habitat to the relatively open, low-growing shrub/grassland vegetation preferred by vireos.

Summary

Periodic prescribed burning, selective brush management, control of deer and exotic wildlife numbers, and good grazing management practices, including proper stocking and rotational grazing, are management options that can be used to create and maintain Black-capped Vireo habitat. These same management tools will also maintain diverse and productive rangelands. In addition to providing food, fiber, and support for rural landowners, well-managed rangelands provide habitat for a wide variety of wildlife, and benefits such as clean water, natural diversity, and recreational opportunities for all Texans.

Technical assistance in range and wildlife management, including grazing management, determination of proper stocking rates, prescribed burning, brush management, and management for endangered species, is available to landowners and managers by contacting the Texas Parks and Wildlife Department or U.S. Natural Resources Conservation Service. Information is also available from the Texas Agricultural Extension Service. Further guidance and specific questions concerning Black-capped Vireo research, endangered species management and recovery, and landowner responsibilities under the Endangered Species Act, should be directed to the U.S. Fish and Wildlife Service or Texas Parks and Wildlife Department. If, after reading this leaflet, you are still unsure whether or not your management plans will adversely affect the Vireo or its habitat, please contact the U.S. Fish and Wildlife Service for assistance.

Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

Golden-cheeked Warbler

Scientific Name: *Dendroica chrysoparia*

Federal Status: Endangered, 5/4/90 • State Status: Endangered

Description

The Golden-cheeked Warbler is a small, migratory songbird, 4.5 to 5 inches long, with a wingspan of about 8 inches. The male has a black back, throat, and cap; and yellow cheeks with a black stripe through the eye. Females are similar, but less colorful. The lower breast and belly of both sexes are white with black streaks on the flanks.

Male Golden-cheeked Warbler
© Greg W. Lasley

Female Golden-cheeked Warbler
© Greg W. Lasley

Habitat

Typical nesting habitat is found in tall, dense, mature stands of Ashe juniper (blueberry cedar) mixed with trees such as Texas (Spanish) oak, Lacey oak, shin (scalybark) oak, live oak, post oak, Texas ash, cedar elm, hackberry, bigtooth maple, sycamore, Arizona walnut, escarpment cherry, and pecan. This type of woodland generally grows in relatively moist areas such as steep-sided canyons and slopes. A mix of juniper and deciduous trees on the slopes, along drainage bottoms, and in creeks and draws provide an ideal mix of vegetation for these birds. Warblers are also occasionally found in drier, upland juniper-oak (i.e. live oak, post oak, blackjack oak) woodlands over flat topography.

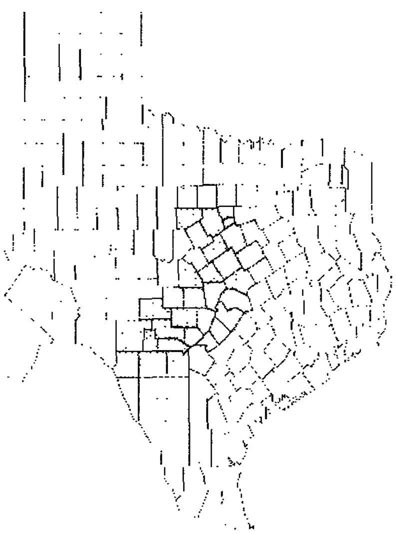
It is important to note that not all woodlands, such as those described above, are used by Golden-cheeked Warblers. Only habitat actually used by endangered or threatened animals is subject to protection by the Endangered Species Act (ESA).

Warblers need a combination of mature Ashe juniper and hardwood trees in their nesting habitat. Mature juniper trees vary in age and growth form, depending on site factors. Generally, trees required for nesting habitat are at least 20 years old and 15 feet tall. The essential element is that juniper trees have shredding bark, at least near the base of the tree.

Although the composition of woody vegetation varies within suitable warbler habitat, Ashe juniper is often, but not always, the dominant species. Studies have shown that juniper comprises anywhere from 10 to 90 percent of total trees in occupied habitat at 27 sites scattered throughout the breeding range.

In general, Golden-cheeked Warblers prefer areas with a moderate to high density of older trees, and dense foliage in the upper canopy. Higher warbler densities are associated with greater average tree height, greater variability in tree heights, and greater density of deciduous trees.

Golden-cheeked Warblers have been found in patches of habitat smaller than 12 acres, although they are believed to do better in larger tracts. With increasingly fragmented habitat, smaller patches may become more important to warblers, particularly those located near areas of occupied habitat.



Life History

The Golden-cheeked Warbler's entire nesting range is currently confined to about 33 counties in central Texas. The birds are dependent on Ashe juniper (blueberry juniper or cedar) for fine bark strips used in nest construction. Although nests may be placed in various species of trees, such as juniper, Texas oak, live oak, and cedar elm, all nests contain strips of Ashe juniper bark woven together with spider webs.

Warblers feed almost entirely on caterpillars, spiders, beetles, and other insects found in foliage. The birds are thought to take advantage of insect blooms associated with different plants as the growing season progresses. For example, broad-leaved trees and shrubs, especially oaks, *are particularly important in providing habitat for insects* during the first part of the nesting season. Later in the season, warblers are frequently seen foraging in Ashe juniper. Mesic (relatively moist) conditions, such as those found on wooded slopes, canyon bottoms, and along creeks and draws, are especially favorable for the production of insect foods.

Depending on the location and quality of habitat, Golden-cheeked Warblers forage and nest in areas of habitat ranging in size from five to 20 acres per pair. Within suitable nesting habitat, male Golden-cheeked Warblers occupy an area, called a territory, which is vigorously defended against all other male Golden-cheeked Warblers. Nesting territories range in size from three to six acres. Banding studies show that males often occupy the same territory in subsequent breeding seasons. Male warblers can often be located through their territorial song, described as a rather hurried, buzzy "tweah-tweah-twee-sy." Single, sharp "chipping" calls can frequently be heard as Golden-cheeks forage among the trees.

The female does most of the work of nest building and incubating the eggs. The cup-like nest is often neatly tucked into the fork of a vertical limb and camouflaged to blend with the bark of the tree. Nests are constructed at an average height of 15 feet above ground, although they have been found as low as five feet and as high as 32 feet. The male stays nearby, singing his distinctive song and defending his territory during incubation.

During April, a single clutch of three to four eggs is laid. Warblers usually nest only once per season, unless a nest is lost to accident or predation. The eggs hatch in 12 days, and both parents care for the young. After the young hatch, male singing declines, although they can still be heard into June. Nestlings fledge eight or nine days after hatching, but remain in the vicinity of the territory for at least four weeks while being cared for by both parents.

Golden-cheeked Warblers *migrate to their wintering grounds* in the pine-oak woodlands of southern Mexico (Chiapas), Guatemala, Honduras, and Nicaragua from late June to mid August. They return to Texas in early to mid-March.

Threats and Reasons for Decline

The most serious problem facing the Golden-cheeked Warbler today, as in the recent past, is habitat loss and fragmentation. Since warblers have limited and specific habitat requirements, direct habitat loss has resulted in population reduction, although precise comparisons of historic and current populations are not available.

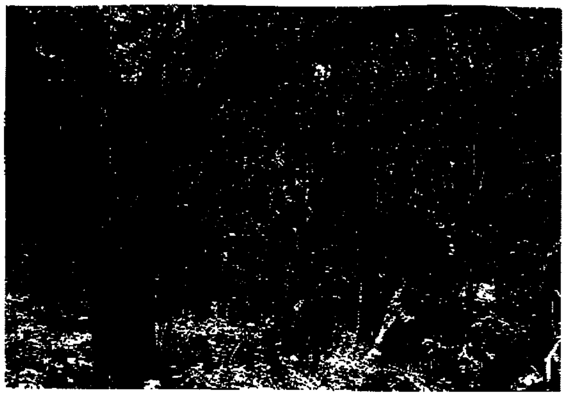
Recently, serious losses in nesting habitat have occurred in counties such as Travis, Williamson, and Bexar, where rapid urban development has spread into oak-juniper woodlands associated with canyonlands. Flood control and other impoundments have also reduced habitat for the warbler by inundating the juniper-oak woodlands existing on canyon slopes and bottoms along springs, streams, and rivers. Construction of large reservoirs has also led to loss of warbler habitat due to development of lake-side communities.

Historically, some warbler habitat was lost as a result of clearing juniper/oak woodlands for increased livestock production or improved livestock handling. Stands of large juniper trees were also cut for sale as fenceposts and other timber products, especially before 1940. Overbrowsing by white-tailed deer, goats, and exotic ungulates is believed to contribute to habitat degradation by reducing the survival of seedling oaks and other deciduous trees, which are a vital component of warbler habitat. Also, the deeper and more fertile soils in much of the Hill Country are found in small floodplains along creeks or intermittent streams associated with hillside drainage. Many of these areas, some of them supporting a variety of deciduous trees, were cleared and converted to forage crops and pasture, often resulting in a decrease in the amount of warbler habitat.

Female warbler with insect
© TPWD [illegible]

Warbler at a nest
© TPWD [illegible]

Golden-cheeked Warbler habitat
© TPWD [illegible]



Closed canopy habitat
[illegible]

Juniper with peeling bark
© TPWD D. Keddy Hector

Creek bottom habitat
© TPWD Glen Mills

Habitat loss may be obscured by the increase in juniper on rangeland throughout central Texas. The invasion of juniper on upland sites is often the result of fire suppression, overgrazing, or a combination of both. These young juniper stands invading open rangelands generally lack the kinds and numbers of hardwood trees required by warblers. Warblers are usually not found in monocultures (pure stands) where juniper comprises over 90 percent of the composition throughout a large area.

Poor grazing management practices and fire suppression result in a decline in the diversity and productivity of rangeland. The decline in range condition associated with improper management has led to increases in juniper throughout the Hill Country.

Nest parasitism by Brown-headed Cowbirds may threaten successful reproduction of Golden-cheeked Warblers, although the degree of impact of cowbird parasitism on warbler productivity is not fully understood. Cowbirds lay their eggs in other birds' nests, leaving the host bird to raise the cowbird young. Golden-cheeked Warblers apparently will either abandon parasitized nests, or raise young cowbirds in addition to or in place of their own young. Warblers that abandon parasitized nests may renest later in the season. However, abandonment of first clutches, or raising cowbird young in addition to their own, decreases the total number and survivability of Golden-cheeked warbler young produced.

Finally, habitat fragmentation reduces the quality and quantity of warbler habitat. In small woodland patches, the increased proportion of habitat edge to interior area may increase rates of nest parasitism and predation, so that the surviving populations cannot maintain themselves. Also, increased distance between patches may make recolonization of vacated habitat more difficult.

Habitat management and protection, in Texas and in Mexico and Central America, responsible land stewardship, and incentives for landowners to maintain and develop habitat, are keys to the survival and recovery of the Golden-cheeked Warbler. The diverse mix of hardwoods and junipers in canyons, and on slopes and adjacent hilltops, provide ideal habitat for the warbler. Numerous beautiful and interesting native plants and animals are also found in these canyons.

Recovery Efforts

Research is underway to better understand the life history, habitat requirements, limiting factors, and land management practices affecting the Golden-cheeked Warbler. Population surveys during the breeding season are being conducted in known and potential habitat areas. Efforts to provide information and educational opportunities to landowners and the public regarding life history and habitat requirements of the warbler are also a vital part of the recovery effort.

Additional research in Mexico is planned to gather information concerning life history and habitat requirements on the wintering range. Studies are needed to assess the potential for income generating activities, such as selective harvest of juniper, which may be compatible with habitat protection.

Where To See the Golden-cheeked Warbler

A number of state lands, including Colorado Bend State Park (SP), Dinosaur Valley SP, Garner SP, Guadalupe River SP, Honey Creek State Natural Area (SNA), Hill Country SNA, Kerr Wildlife Management Area, Longhorn Cavern SP, Lost Maples SNA, Meridian SP, Pedernales Falls SP, and Possum Kingdom SP offer opportunities for people to see Golden-cheeked Warblers and their habitat. Other locations include the Travis Audubon Sanctuary, Wild Basin Preserve, and Emma Long City Park in the Austin area; and Friedrich Wilderness Park near San Antonio. Once they are opened to the public, the Balcones Canyonlands National Wildlife Refuge, located northwest of Austin, and Government Canyon State Park, located northwest of San Antonio, will offer additional opportunities to see Golden-cheeked Warblers.

Because the Golden-cheeked Warbler is an endangered species, birders and other observers should carefully follow certain viewing ethics. Recorded calls of the Golden-cheeked Warbler or Screech Owl should not be used to attract birds and observers should be careful not to disturb or stress birds.

How You Can Help

You can help by providing encouragement and support for private landowners who are managing their land to protect natural diversity and endangered species habitat. Landowners are encouraged to learn the facts about the Golden-cheeked Warbler and its habitat needs, and to protect areas of habitat found on their property.

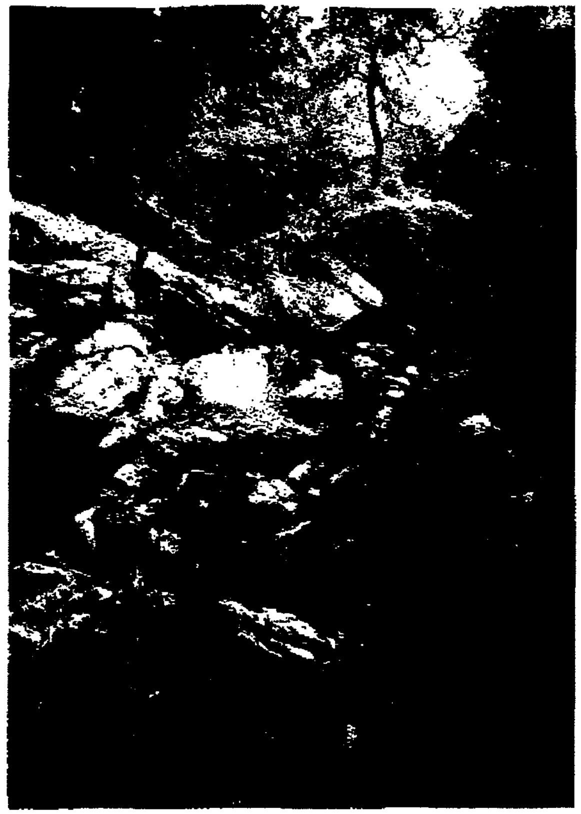
The Golden-cheeked Warbler is a beautiful songbird, and is much sought after among people who enjoy birdwatching and nature study. Possibilities exist for landowners to take advantage of the growing demand for natural history tours and vacations. Landowners interested in more information concerning ecotourism opportunities should contact the Nongame and Urban Fish and Wildlife Program, Texas Parks and Wildlife Department, Austin (800-792-1112).

Finally, you can be involved in the conservation of Texas' nongame wildlife resources by supporting the Special Nongame and Endangered Species Conservation Fund. Special nongame stamps and decals are available at Texas Parks and Wildlife Department (TPWD) field offices, most state parks, and the License Branch of TPWD headquarters in Austin. Each dollar contributed to this fund helps TPWD conduct research and management and acquire habitat for nongame and endangered wildlife. Conservation Passports, available from Texas Parks and Wildlife, are valid for one year and allow unlimited access to most State Parks, State Natural Areas, and Wildlife Management Areas. Conservation organizations in Texas also welcome your participation and support.

For More Information Contact

Texas Parks and Wildlife Department
Endangered Resources Branch
4200 Smith School Road
Austin, Texas 78744
(512) 912-7011 or (800) 792-1112
or
U.S. Fish and Wildlife Service
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512) 490-0057

Management guidelines are available from the Texas Parks and Wildlife Department and U.S. Fish and Wildlife Service for landowners and managers wishing to maintain and improve habitat for the Golden-cheeked Warbler.


Golden-cheeked Warbler habitat
© TPWD Bill Reaves


Urban expansion
© USFWS Wyman Meinzer


Warbler with identification band
© TPWD

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Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

Management Guidelines for the Golden-cheeked Warbler

The descriptions presented in this document are intended to help landowners determine if they have Golden-cheeked Warbler habitat on their property. Not all sites within the habitat types described will be used by Golden-cheeked Warblers. It is only where individuals of this species occupy the identified habitat types during the breeding season that special management considerations such as those provided in these guidelines need to be considered.

Private landowners have a tremendous opportunity to conserve and manage the fish and wildlife resources of Texas. The objective of these guidelines is to provide landowners with recommendations about how typically-used land management practices could be conducted so that it would be unlikely that golden-cheeked warblers would be adversely impacted. The guidelines will be updated periodically to make them more practical and useful to rural landowners. The guidelines are based on the best available information and current understanding about the biology of the warbler, but may be refined as more complete biological data are collected. TPWD biologists have prepared these guidelines in consultation with USFWS biologists to assure landowners who carry out land management practices within the guidelines that they would know, with the greatest certainty possible, that they would not be in violation of the E.S.A.

This document also provides information on land management practices that are appropriate for protection and/or enhancement of habitat. The categories were chosen to represent commonly encountered vegetation types and to address common questions regarding the effect of management practices on Golden-cheeked Warblers. In addition, suggestions are offered that promote conservation of soil, water, plant, and wildlife resources.

Habitat Descriptions

Habitat Types Where Warblers Are Expected To Occur

Woodlands with mature Ashe juniper (cedar) in a natural mix with oaks, elms, and other hardwoods, in relatively moist (mesic) areas such as steep canyons and slopes, are considered habitat types that are highly likely to be used by warblers. These areas generally will have a nearly continuous canopy cover of trees with 50 to 100 percent canopy closure. This habitat type is also important for deer, turkey, songbirds, and a variety of other wildlife due to the diversity of vegetation and topography and, in many cases, proximity to water. Woodlands of this description should be retained wherever they occur, especially along creeks and draws, and on steep slopes and generally rough terrain. Landowners with woodlands that fit the above description should assume that warblers may be using the area and are advised to follow the management guidelines presented here. Additional information regarding habitat types and their potential to support Golden-cheeked Warblers is presented in Table 1.

Habitat Types That May Be Used By Warblers

It is relatively easy to recognize the above described high quality habitat types where Golden-cheeked Warblers are likely to occur. However, there are a number of other vegetation types that may also be used by warblers, depending on the location, size of tract, land use, adjacent landscape features, and vegetation structure. These habitat types are most often used by warblers when they are located adjacent to or near areas of high quality habitat.

The four habitat types discussed below are associated with a variety of tree canopy cover, ranging from 35 to 100 percent. Although not representative of what is typically thought of as the "best" warbler habitat, these areas may support Golden-cheeked Warblers, especially fledglings (young birds that have left the nest). These habitats may be relatively more important to warblers nesting in the western and northern portions of the species' breeding range, or in areas where optimal habitat no longer exists. Although these habitat types may occupy a large geographic area within the Hill Country, little is known about warbler occupancy when the sites are not close to the optimal habitat types. Landowners are advised, however, to treat the following vegetation types as occupied habitat until technical assistance is obtained or a survey done to determine whether or not specific areas support warblers:

1. Stands of mature Ashe juniper (trees with shredding bark), over 10 feet in height, with scattered live oaks (at least 10% total canopy cover), where the total canopy cover of trees exceeds 35 percent.
2. Bottomlands along creeks and drainages which support at least a 35 percent canopy of deciduous trees, with mature Ashe juniper growing either in the bottom or on nearby slopes.
3. Mixed stands of post oak and/or blackjack oak with scattered mature Ashe juniper (10-30% canopy cover), where the total canopy cover of trees exceeds 35 percent.
4. Mixed stands of shin (scaly-bark) oak with scattered mature Ashe juniper (10-30% canopy cover), where the total canopy cover of trees exceeds 35 percent (See Table 1).

Table 1. Ecological site types and Range Sites with plant communities that may provide habitat for Golden-cheeked Warblers. On flat or rolling uplands, warblers are most likely to occupy larger patches of woodlands adjacent to canyon systems. Most of the flat and rolling uplands within these Range Sites have other plant communities, like open savannahs, that do not support warblers. Sites that are not used by warblers are described in the Habitat Descriptions section of this leaflet.

Site Description	Range Site	Typical Plant Communities that may support Golden-cheeked Warblers	Potential for Golden-cheeked Warblers
Slopes and canyons, and associated creek bottoms[1]	Adobe Clay Loam[2] Loamy Bottomland[2] Steep Adobe Steep Rocky	Continuous canopy woodland* of Ashe Juniper, Texas Oak, Live Oak, Lacey Oak, Cedar Elm, Escarpment Blackcherry, Texas Ash, Pecan, and other deciduous trees	Highly likely to be used
Flat or rolling uplands with shallow, rocky soils of variable depth[3]	Adobe Low Stony Hill Shallow Very Shallow	Continuous canopy woodland* of Live Oak, Shin Oak, Vasey Oak, Cedar Elm, Hackberry, Redbud, Ashe Juniper, and other hardwood trees	Highly likely to be used
		Patchy woodlands+ or interspersed mottes of mature Live Oak, Shin Oak, Ashe Juniper, and other shrubs	May be used
Flat or rolling uplands with reddish soils[4]	Deep Redland[5] Gravelly Redland[5] Redland[5]	Continuous canopy woodland* of Live Oak, Blackjack Oak, Post Oak, and Ashe Juniper	Highly likely to be used
		Patchy woodlands+ or interspersed mottes of mature Live Oak, Blackjack Oak, Post Oak, and Ashe Juniper	May be used
Flat or rolling uplands with shallow but more continuous rocky soils over limestone[6]	Low Stony Hill	Continuous canopy woodland* of Ashe Juniper, Live Oak, and Shin Oak	May be used
		Patchy woodlands+ or interspersed mottes of mature Live Oak, Ashe Juniper, Hackberry, Cedar Elm, and Mesquite	May be used

*Defined as 50-100% canopy cover of trees at least 15 feet in height or greater.
+Defined as 35-50% canopy cover of trees at least 15 feet in height or greater.

[1]Common woody plants include Ashe Juniper, Texas Oak, Live Oak, Lacey Oak, Chinkapin Oak, Cedar Elm, Escarpment Blackcherry, Texas Ash, Bigtooth Maple, Redbud, Hackberry, Texas Persimmon, Deciduous Holly, Arizona Walnut, Carolina Buckthorn, Carolina Basswood, Roughleaf Dogwood, Pecan, Sycamore, and Bald Cypress.

[2]Stream bottoms in and near canyon systems.

[3]Common woody plants include Live Oak, Shin Oak, Vasey Oak (West), Cedar Elm, Hackberry, Redbud, Ashe Juniper, Texas Persimmon, Texas Ash, Texas Oak, and Lacey Oak.

[4]Common woody plants include Live Oak, Blackjack Oak, Post Oak, Shin Oak, Lacey Oak, Texas Oak, Ashe Juniper, Cedar Elm, Hackberry, and Texas Madrone.

[5]Golden-cheeked Warblers may occur on Redland Range Sites adjacent to slope and canyon habitat. It is not known whether or not warblers occur on Redland Sites isolated from canyon systems.

[6]Common woody plants include Hackberry, Texas Persimmon, Texas Ash, Live Oak, Texas Oak, Ashe Juniper, Evergreen Sumac, Cedar Elm, and Mesquite.

Areas Where Warblers Are Not Expected To Occur

Although junipers occur abundantly over much of the Hill Country, a relatively small portion of them are actually a part of good warbler habitat. The following types of areas are not warbler habitat and are unlikely to be used by warblers. As long as these areas are not in close (within 300 ft.) proximity to warbler habitat, neither surveys nor permits are required for activities within these areas.

1. Stands of small Ashe juniper, averaging less than 10 feet in height, are not habitat. This includes "regrowth cedar" that invades open rangelands, previously cleared areas, or old fields. These areas are often dry and relatively flat, and lack oaks and other broad-leaved trees and shrubs. Generally, areas such as those described above that have been cleared within the last 20 years are not considered habitat.
2. Pure stands of larger (greater than 10 feet in height) Ashe juniper, with few or no oaks or other hardwoods.
3. Open park-like woodlands or savannahs (even with old junipers) where canopy cover of trees is less than 35 percent. These areas often have scattered live oaks and other trees.
4. Small junipers and other trees coming up along existing fencelines.
5. Small junipers coming up under larger hardwoods where junipers have been removed in the past 20 years, unless the junipers have shredding bark.

Open savannah – not habitat
© Matt Wagner

Regrowth cedar – not habitat
© Matt Wagner

Controlling juniper on these areas by prescribed burning, handcutting, or well-planned mechanical methods is often desirable to improve range condition and plant diversity, and is compatible with protection of Golden-cheeked Warbler habitat. Maintaining a 300 feet wide buffer of woodland (or woody) vegetation adjacent to and around Golden-cheeked Warbler habitat is beneficial. However, when necessary brush management and maintenance activities near habitat should not occur during the March-August nesting season to avoid disturbance of possible nesting and feeding activities. Since brush management activities can affect habitat for the Black-capped Vireo as well as the Golden-cheeked Warbler, landowners are encouraged to learn about the habitat requirements of both endangered songbirds.

It is important in wildlife management in general, and in endangered species management in particular, to consider the "big picture" with regard to how land types relate to one another. For example, when brush management practices are planned in non-habitat areas, one should consider the proximity of the area to habitat used by warblers.

Management Practices in Golden-cheeked Warbler Habitat

Disruption of the tree canopy should be avoided when planning ranch improvements or maintenance work in Golden-cheeked Warbler habitat. It is recommended that new fencelines and livestock watering facilities (pipelines, storage tanks, ponds) be planned to avoid areas of habitat whenever possible. However, narrow linear openings, such as those needed for traditional agricultural management (fencelines, ranch roads, livestock water pipelines) will not harm Golden-cheeked Warblers. Typically, fencelines and other linear openings of about 16 feet in width are large enough to allow for maintenance, while permitting the hardwood tree canopy to grow over the gap. New developments in permanent electric fencing may enable landowners to crossfence areas of rough terrain with little or no disturbance to the tree canopy. Often, these power fences are the most cost effective way to crossfence areas of steep topography and shallow soils. Fencing and other ranch improvement work in Golden-cheeked Warbler habitat should be done during the non-nesting period (September-February).

Dozing or handcutting in habitat with closed tree canopy and steep slopes not only destroys warbler habitat, but mechanical disturbance also can create serious soil erosion problems. In addition, clearing these areas is generally not cost effective due to higher clearing costs, lower forage production potential, and grazing distribution problems associated with steep slopes. Selective removal of young "bushy" juniper less than 10 feet in height within habitat is not a problem as long as the tree canopy is not disturbed. Any selective removal of juniper within or adjacent to habitat should be done during the non-nesting period (September-February).

When mature juniper trees are abundant in the habitat, incidental removal of juniper for use as fenceposts on the ranch will have little impact on warbler habitat. The number of trees cut depends on the density of Ashe juniper in the habitat. For example, more trees could be removed from an area with a high density of juniper compared with the density of hardwoods. The idea should always be to provide a mix of juniper and hardwoods. When posting is done, trees should be selected to avoid disturbance to the tree canopy. One way to do this is to select trees with a relatively small individual canopy and scatter your tree selections over the area. Posting should not occur in habitat during the nesting period (March-August).

In habitat areas and on rangelands immediately adjacent to habitat, it is important to manage grazing pressure by deer and livestock to prevent overbrowsing of broad-leaved shrubs and trees, and to maintain plant diversity and productivity. Controlling the number of browsing animals (deer, exotic animals, and livestock) is important to maintain hardwood seedlings and ensure eventual replacement of deciduous trees in the canopy. Range condition improvement in and adjacent to habitat areas, through proper grazing management and planned deferment, will likely prove beneficial to livestock and wildlife, including the Golden-cheeked Warbler.

Landowners with questions regarding how ranch improvements and management practices will affect habitat are advised to seek technical assistance from the Texas Parks and Wildlife Department, U.S. Natural Resources Conservation Service (formerly Soil Conservation Service), or U.S. Fish and Wildlife Service. For activities other than those described above, land managers should seek assistance from the U.S. Fish and Wildlife Service, since permits may be required.

Other Management Suggestions

Reducing Impacts From Predation and Cowbird Parasitism

Reducing the impacts of predation and nest parasitism by Brown-headed Cowbirds may be important for successful reproduction in some populations of Golden-cheeked Warblers. This may be particularly true where warblers nest near grazed land or grain crops. Research is currently underway to better understand the impacts of cowbirds on Golden-cheeked Warblers.

Planned grazing systems designed to rotate livestock away from known nesting areas during the breeding season (March-August) may be desirable to reduce cowbird impacts. Periodic rest also has important benefits for improving range condition and productivity. Since cowbirds are attracted to easily available food sources, spilling or scattering grain should be avoided. Supplemental feeding areas should be moved frequently, located away from nesting habitat, and kept free from accumulations of waste grain.

Leaving woodland vegetation adjacent to Golden-cheeked Warbler habitat is often desirable to reduce predation and nest parasitism by Brown-headed Cowbirds. Woodland strips of 300 feet or more are preferable.

Finally, controlling cowbirds through trapping may be effective in reducing warbler nest parasitism. Mounted mobile traps, placed near watering sites as livestock are rotated through pastures, have been used successfully to reduce cowbird numbers. Contact Texas Parks and Wildlife Department or the U.S. Fish and Wildlife Service for information and assistance in implementing a cowbird control program.

Habitat Restoration

The following suggestions are offered for landowners wishing to restore or create habitat for the Golden-cheeked Warbler in areas that currently do not support warblers. One type of restorable habitat is the relatively mesic (moist) area, with a diversity of deciduous trees, where junipers have been previously removed. Allowing the reestablishment of juniper on these sites would eventually result in the mature oak-juniper woodland preferred by Golden-cheeked Warblers.

Other situations where restoring habitat may be a possibility include relatively mesic areas dominated by juniper, where heavy browsing pressure by deer or livestock has prevented the establishment of hardwood seedlings. In these areas, control of deer numbers and planned deferment from livestock grazing would promote reestablishment of broad-leaved shrubs and trees, eventually resulting in a mature juniper-oak woodland.

In mesic areas where small junipers (10 ft. or less) are dominant, small junipers could be thinned to favor faster growth of remaining trees. Thinning would encourage hardwood regeneration, especially if some slash is left in place to provide protection for hardwood seedlings. If large junipers are dominant, several small openings per acre would encourage hardwood regeneration. These openings should be protected from browsing and left to regenerate naturally, or planted to native hardwoods. In each of these examples, the idea is to restore areas that may once have provided habitat to the natural oak-juniper woodland capable of growing on the site.

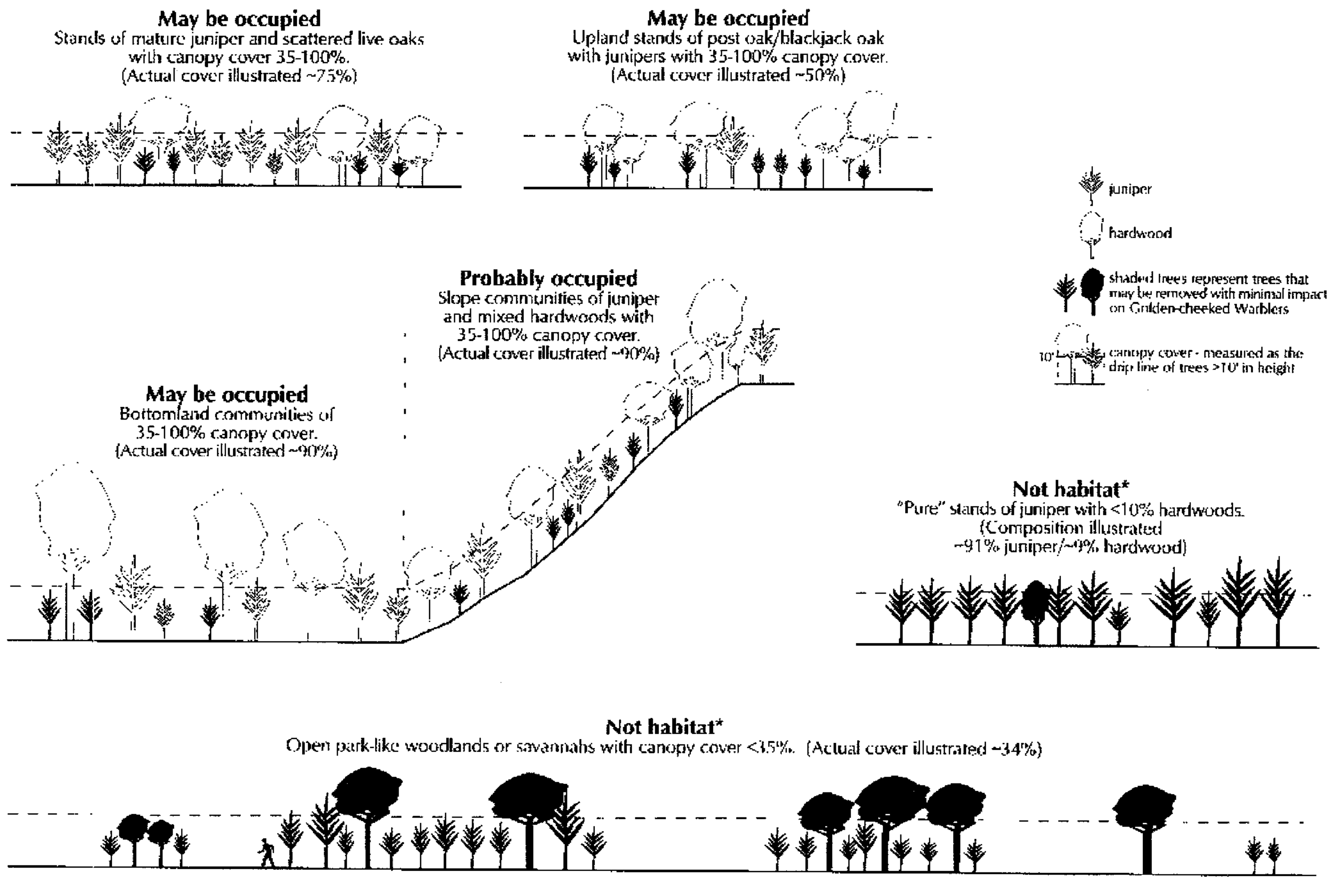
Further Guidance Concerning the ESA

Good range management practices such as proper stocking, rotational grazing, prescribed burning, periodic deferments, carefully planned brush control, and attention to plant and animal resource needs will help prevent loss of Golden-cheeked Warbler habitat. Habitat where Golden-cheeked Warblers are likely to occur should be protected from activities that alter the composition or structure of trees and shrubs, except as provided for in these guidelines. Likewise, management activities in areas that may be used by warblers should be carefully planned to avoid altering vegetation composition and structure and timed to avoid the breeding season until a survey is done to determine if warblers are using the area.

Landowners who are not sure whether or not they have suitable Golden-cheeked Warbler habitat, or whether a planned activity will affect these birds, may want to consult a biologist familiar with the species. An on-site visit by a biologist familiar with the warbler can determine if warbler habitat is present and whether the planned activity falls under the guidelines presented here. Also, a biologist who has a scientific permit from the U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department to do Golden-cheeked Warbler survey work will know how to conduct a breeding season survey (approximately March 20 to May 15) to determine if warblers are present in the area for which a management activity is planned. Finally, important habitat components such as the ratio of mature juniper to deciduous trees, and canopy structure and height, should be retained whenever possible to enable population recovery.

Technical Assistance

Technical assistance in range and wildlife management, including management for endangered species, is available to landowners and managers by contacting the Texas Parks and Wildlife Department, U.S. Natural Resources Conservation Service, or U.S. Fish and Wildlife Service. Additional information is available from the Texas Agricultural Extension Service. Further guidance and specific questions concerning Golden-cheeked Warbler research, endangered species management and recovery, and landowner responsibilities under the Endangered Species Act, should be directed to the Texas Parks and Wildlife Department or U.S. Fish and Wildlife Service.



*As long as these areas are not in close (within 300 feet) proximity to "probably occupied" or "may be occupied" habitat, neither surveys nor permits are required for activities within these areas.

Funds for the production of this leaflet were provided by the U.S. Fish and Wildlife Service, under Section 6 of the Endangered Species Act.

United States Department of the Interior

FISH AND WILDLIFE SERVICES
Austin Ecological Services Office
Hartland Bank Building
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512)490-0057

OCT 20 1999

To all interested parties:

Enclosed is a copy of the Federal Register notice, published on October 20, 1999, adding the Devils River minnow (*Dionda diaboli*) to the list of federally threatened and endangered species according to the U.S. Endangered Species Act of 1973, as amended. No critical habitat was designated for the species. Although the minnow was originally proposed to be listed as endangered, the final determination was to designate it as a threatened species. This was based on new information received during the public comment period and the commitments to conservation of the species by the State of Texas and City of Del Rio through a conservation agreement. Also enclosed are Questions and Answers and a Fact Sheet to better explain the reasons and implications of our decision.

The Devils River minnow was historically one of the most abundant fish collected throughout at least four streams in Val Verde and Kinney counties, Texas. Now the species can be confirmed from three sites in Texas and one location in Cohuila, Mexico. The combination of restricted range and scarcity of Devils River minnow makes it vulnerable to extinction. The primary reasons for concern for the Devils River minnow are the reduction in the species' range and declines in abundance within the remaining limited range. Existing and future threats to the species are most likely associated with habitat loss (declines in water quantity and quality within the streams the fish inhabits) and predation from the introduction of non-native fish species. It is probably a number of factors acting together that have affected the species and its habitat.

The final rule adding the Devils River minnow to the list will be effective 30 days from the date of publication in the Federal Register, November 19, 1999.

For questions, please contact Mr. Nathan Allan of my staff at 512/490-0057, ext. 237.

Sincerely,

David C. Frederick
Supervisor

Enclosures

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AE 86

Endangered and Threatened Wildlife and Plants; Final Rule To List the Devils River Minnow as Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service, determine the Devils River minnow (*Dionda diaboli*) to be a threatened species under the authority of the Endangered Species Act of 1973, as amended (Act). The Devils River minnow is a small fish with a known distribution limited to three locations in Val Verde and Kinney counties, Texas, and one drainage in Coahuila, Mexico. The species' range is significantly reduced and fragmented due to habitat loss from dam construction, spring dewatering, and other stream modifications. The numbers of Devils River minnows collected during fish surveys over the past 25 years have declined; once one of the most abundant fish in the Devils River, the minnow has now become one of the least abundant. The species' decline in abundance in the Devils River may be attributed to the effects of both habitat modification and possibly predation by smallmouth bass (*Micropterus dolomieu*), an introduced game fish.

We originally proposed to list the Devils River minnow as endangered. However, since publication of the proposed rule, a Conservation Agreement (Agreement) for the species has been signed and specific milestones for conservation actions have been agreed to by us, the Texas Parks and Wildlife Department (TPWD), and the City of Del Rio. We determine that the actions already accomplished under this Agreement, have reduced the imminence of the threats to the species sufficiently to justify a threatened designation. This action will implement Federal protection provided by the Act for the Devils River minnow. We determine that designation of critical habitat for the Devils River minnow is not prudent.

EFFECTIVE DATES: The effective date of this rule is November 19, 1999.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Austin Ecological Services Field Office, 10711 Burnet Road, Suite 200, Austin, Texas, 78758.

FOR FURTHER INFORMATION CONTACT: Nathan Allan, Fish and Wildlife Biologist, at the above address, telephone 512/490–0057, or facsimile 512/490–0974.

SUPPLEMENTARY INFORMATION:

Background

The Devils River minnow (*Dionda diaboli* Hubbs and Brown) is classified in the Cyprinidae (minnow) family. It was first collected from Las Moras Creek, near Brackettville, Texas, on April 14, 1951. The species was described by Hubbs and Brown (1956) from specimens collected in the Devils River at Baker's Crossing (southern-most bridge crossing of State Highway 163) in 1951. The species occurs with similar minnows, such as the closely related manantial roundnose minnow (*Dionda argentosa*) and is also related to the more common roundnose minnow (*Dionda episcopa*). Devils River minnow is recognized as a distinct species by the American Fisheries Society (Robins *et al.* 1991) based on morphological characteristics (Hubbs and Brown 1956), genetic markers (Mayden *et al.* 1992), and chromosome differences (Gold *et al.* 1992).

The Devils River minnow is a small fish, with adults reaching sizes of 25–53 millimeters (mm) (1.0–2.1 inches (in.)) standard length. The fish has a wedge-shaped caudal (near the tail) spot and pronounced lateral stripe with double dashes extending through the eye to the snout but not reaching the lower lip. The species has a narrow head with prominent dark markings on scale pockets above the lateral line that produce a cross-hatched appearance when viewed from the top (Hubbs and Brown 1956).

Little information is available on life history characteristics, feeding patterns, or reproductive behaviors of this species. However, based on their extended intestinal tract, species of the genus *Dionda* are considered to feed primarily on algae. Since *Dionda episcopa*, a closely related species, are broadcast spawners with nonadhesive eggs that sink to the substrate (Johnston and Page 1992), we believe Devils River minnows are as well.

[redacted] Devils River [redacted] have been described as channels of fast-flowing, spring-fed waters over gravel substrates (Harrell 1978). Although the species is closely associated with spring systems, it most often occurs where spring flow enters a stream, rather than in the spring outflow itself (Hubbs and Garrett 1990). The species is adapted to the hydrologic variations inherent in desert river systems (Harrell 1978), which are characterized by extended droughts and extreme flash floods (USGS 1989).

The Devils River minnow is part of a unique fish fauna in west Texas streams where a mixture of fishes occur, including Mexican peripherals, local endemics, and widespread North American fishes (Hubbs 1957). About half of the native fishes of the Chihuahuan Desert of Mexico and Texas are considered by Hubbs as threatened (1990) and at least four species have been documented to be extinct (Miller *et al.* 1989), primarily due to habitat destruction and introduced species.

The Devils River minnow is native to [redacted], Texas, and Coahuila, Mexico. The known historical range of the species is based on collections from the 1950's and 1970's and includes [redacted]

See Map 130 in Roads of TX

[redacted] Rio San Carlos, Mexico; and the Rio Salado Drainage, Mexico (Brown 1955; Hubbs and Brown 1956; Robinson 1959; Harrell 1978; Smith and Miller 1986; Garrett *et al.*, 1992). Despite numerous collection efforts, the species has never been reported from the mainstem Rio Grande, the Rio Conchos drainage, or tributary streams other than those listed above. The range of the species prior to 1951 is unknown.

A comprehensive assessment of the distribution of Devils River minnow in Texas was described by Garrett *et al.* (1992). This study documented the presence of the species in 1989 at two sites on the Devils River [redacted], two sites on San Felipe Creek, and one site on Sycamore Creek. None were collected in samples from Las Moras Creek.

Garrett *et al.* (1992) found that Devils River minnow was very rare throughout its range in 1989 compared to past collections. At 24 sampling locations within the historical range, a total of only 7 individuals were collected from 5 sites. In addition to declines in the Devils River minnow populations, Garrett *et al.* (1992) also observed a general shift in community structure toward fishes that tend to occupy quiet water or pool habitat, conditions that are often limited in flowing spring runs. The authors hypothesized that this shift was the result of reduced stream flows from drought, exacerbated by human modification of stream habitats, especially in Sycamore and Las Moras creeks.

The most recent information from collections in 1997 and 1998 confirm the existence of Devils River minnow in only three locations in Texas—two sites in small streams tributary to the Devils [redacted] Rio.

We are unaware of any published information on the status of the Devils River minnow in Mexico. A review of museum records indicates that the species may now occur in only one locality in Mexico. Populations there appear to be very depressed (S. Contreras-Balderas, University of Nuevo Leon, *in litt.* 1997) and face significant threats from industrial and agricultural development (Contreras and Lozano 1994).

The region of Texas where the Devils River minnow occurs is semi-arid, receiving an average of about 46 centimeters (cm) (18 in.) of rainfall annually. Spring-fed streams of west Texas flow southerly through rocky, limestone soils and shrubby vegetation characteristic of the more arid western reaches of the Hill Country. The aquifer that sustains spring flows within the range of the Devils River minnow is the Edwards-Trinity (Plateau) Aquifer. This major aquifer produces the largest number of springs in Texas (Brune 1975). The contributing and recharge area for springs on the Devils River and San Felipe Creek is suspected to include a large area as far north as Sheffield in Pecos County and Eldorado in Schleicher County, although the subsurface hydrogeomorphology (underground water characteristics) of the region is not well-defined (Brune 1981). The flow from springs fluctuates considerably, depending on the amount of rainfall, recharge, and water in storage in the aquifer. Conservation of the quality and quantity of this groundwater supply is essential for the continued existence of the Devils River minnow.

[redacted] Exceptions include the [redacted] located north of Dolan Falls and managed by the TPWD (Baxter 1993), and land adjoining portions of San Felipe Creek owned by the [redacted] population of about 38,000). One important private holding is the Dolan Falls Preserve in the middle portion of the Devils River owned by The Nature Conservancy (Baxter 1993). Primary land uses within the watersheds supporting Devils River minnow are cattle, sheep, and goat ranching. Generally, these areas are very remote with little human development beyond that necessary to support ranching operations.

The Devils River minnow is currently listed as a threatened species by the State of Texas, the Texas Organization for Endangered Species (Hubbs *et al.* 1991), and the Endangered Species Committee of the American Fisheries Society (Williams *et al.* 1989). The Devils River minnow is listed as an endangered species in Mexico (NOM-ECOL-059).

The Agreement for Devils River minnow was signed by the Service, the TPWD (in cooperation with local landowners), and the City of Del Rio on September 2, 1998, to expedite conservation measures needed to ensure the continued existence of the species. Preliminary drafts of the Agreement were made available to local landowners for comment and a draft version was also distributed at a public hearing on the proposal to list the species. The Agreement includes a Conservation Strategy (Strategy) to describe the specific procedures required for conservation of the Devils River minnow. We carefully considered the implementation to date of the conservation actions as described in the Strategy and the effects of that implementation on removing threats to the species when making the final listing determination for the Devils River minnow. Following is a discussion of the conservation actions and implementation that have occurred to date.

The ten conservation actions that are included in the Strategy and their implementation status are:

(1) Determine the current status of the Devils River minnow and monitor changes. This action was initiated in November 1997, (prior to signing the Agreement) with sampling in the mainstem Devils River and San Felipe Creek in Del Rio and continued with collections from Philips Creek and Dolan Creek in May, 1998.

(2) Maintain genetically representative, captive populations of Devils River minnow at two fish hatchery facilities for reintroduction, and as insurance against extinction. This action has been initiated by the TPWD by holding a small number of individuals of Devils River minnow at a hatchery since November 1997. Those individuals produced an unassisted reproductive effort in March 1999, in an artificial stream, indicating that captive propagation is likely readily accomplished. We agreed to assist in this action by providing an additional location to develop captive propagation techniques for the species. We have secured funding for our San Marcos National Fish Hatchery and Technology Center to initiate this action in the very near future.

(3) Reintroduce Devils River minnows, reared in captive populations, in order to reestablish populations in nature. This action has not yet been implemented and depends on a number of other actions being completed before reintroductions can be initiated.

(4) Continue and enhance protection of the San Felipe Creek watershed. This action by the City of Del Rio to protect San Felipe Creek has not yet been implemented. The City has committed to a concept of conservation of the natural environment in any future development plans within the riparian zone of the creek (Beth Eby, City Manager, City of Del Rio, *in litt.* 1997). This action will be an ongoing effort by the City for protection of this population of Devils River minnow.

(5) Provide technical assistance to landowners on riparian protection and management. Not yet initiated.

(6) Review live bait harvest and selling practices in the Devils River area to develop methods and take appropriate actions (for example,

regulation, education) to prevent the further establishment of exotic aquatic species within the historical range of Devils River minnow. Not yet initiated.

(7) Document the abundance and ranges of exotic fish in the Devils River, and San Felipe, Las Moras, and Sycamore creeks. Not yet initiated.

(8) Obtain and analyze changes in flow data for the Devils River, and San Felipe, Las Moras, and Sycamore creeks. Not yet initiated.

(9) With progeny of the captive population, use a simulated environment to determine ecological and life history requirements of the Devils River minnow. The TPWD has initiated this action through the purchase and construction of the facilities necessary to do experiments on the ecology of the species. Preliminary experiments have been initiated.

(10) Determine predator/prey interactions between smallmouth bass and the Devils River minnow through field studies. This action will depend in part on the completion of a current study by Texas A&M University and implementation of laboratory experiments discussed in action number 9, above.

In February 1999, we requested confirmation from the TPWD and the City of Del Rio of their commitment to implementation of the Agreement, and clarified some specific milestones for accomplishing the goals of the Agreement. The TPWD and the City concurred in writing to implement key components of the Agreement within the next 2 years. The milestones agreed to by the three parties include:

(1) Have healthy, genetically representative captive stocks of Devils River minnow in at least two facilities. Each facility should maintain two separate stocks, one from the Devils River and one from San Felipe Creek.

(2) Conduct the first annual population monitoring for the Devils River minnow throughout its historical range in the U.S.

(3) Conduct the first annual monitoring for the Devils River minnow throughout its historical range and potential habitats in Mexico.

(4) Conduct the second annual population monitoring for the Devils River minnow throughout its historical range in the U.S.

(5) Improve the status of the Devils River minnow in San Felipe Creek at Del Rio and restore Devils River minnow populations in the headwater springs area. This will be indicated by maintaining stable population sizes of Devils River minnow at Del Rio and restoring population sizes at least equal to those historically in the headwater springs. In addition, implementation of conservation measures in San Felipe Creek in Del Rio (such as a finalized policy by the City of Del Rio for preservation of the San Felipe Creek watershed, development of a San Felipe Creek floodplain restoration plan, completion of a water conservation plan, and completion of a management plan for the golf course) will be completed to reduce threats to the species there.

(6) Improve the status of the Devils River minnow in the Devils River. This will be accomplished by establishing additional locations of Devils River minnow, with population sizes at least equal to historical levels (such as similar to those found by H.L. Harrell in the 1970's). This will include further threat assessment and addressing potential limiting factors in this system, particularly the effects of smallmouth bass and changes in stream flows.

We concur with many of the public comments that supported this cooperative approach. This listing does not preclude continuation of cooperative efforts between parties to the Agreement or continuing efforts to implement the Conservation Strategy. As stated in the introduction of the Agreement, we believe that full implementation of the Strategy may ultimately reduce the threats to the Devils River minnow and allow a future review of the species' status. This could result in a future delisting if threats are removed and the status of the species significantly improves such that recovery has occurred.

Previous Federal Action

On August 15, 1978, we published a proposed rule (43 FR 36117) to list the Devils River minnow as a threatened species and to designate its critical habitat. On March 6, 1979, we published a notice (44 FR 12382) to withdraw the critical habitat portion of the proposal to meet the new critical habitat requirements set forth in the Endangered Species Act Amendments of 1978 (Public Law 95–632, 92 Stat. 3751). We reproposed the designation of critical habitat for the Devils River minnow on May 16, 1980 (45 FR 32348). A notice of public hearing was published on July 9, 1980 (45 FR 46141), and the public hearing was held on July 23, 1980, in Del Rio, Texas. The 1978 amendments to the Act also required that all proposals over two years old be withdrawn. We withdrew the listing and critical habitat proposals on September 30, 1980 (45 FR 64853), because the 2-year time limit on the proposed listing had expired.

We included the Devils River minnow as a category 2 candidate species in notices of review published December 30, 1982 (47 FR 38454), September 18, 1985 (50 FR 37958), and January 6, 1989 (54 FR 554). Category 2 taxa were those that we believed may be eligible for threatened or endangered status, but for which the available biological information in our possession was insufficient to support listing the species. However, new information obtained in 1989 (and later published as Garrett *et al.* 1992) provided a basis for including the Devils River minnow as a category 1 candidate in notices of review published November 21, 1991 (56 FR 58804), and November 15, 1994 (59 FR 58982). Category 1 taxa were those for which we had substantial biological information on hand to support proposing to list the species as threatened or endangered.

As announced in a notice published in the February 28, 1996, **Federal Register** (61 FR 7596), the designation of multiple categories of candidates was discontinued, and only species for which we have sufficient information to support listing are now recognized as candidates. The Devils River minnow remained a candidate species in notices of review published February 28, 1996 (61 FR 7596), and September 19, 1997 (62 FR 49398).

On March 27, 1998, we published a proposed rule to list the Devils River minnow as endangered and invited public comment (63 FR 14885). On May 14, 1998, we published a notice of public hearing on the proposal (63 FR 26764), and a public hearing was subsequently held in Del Rio, Texas, on May 28, 1998. On October 13, 1998, we published a notice reopening the comment period on the proposed rule for an additional 30 days and announcing the availability of new information and the Conservation Agreement (63 FR 54660).

The processing of this final rule conforms with our current listing priority guidance published in the **Federal Register** on May 8, 1998 (63 FR 25503). The guidance calls for giving highest priority to handling emergency situations (Tier 1) and second highest priority to resolving the listing status of outstanding proposed listings, resolving the conservation status of candidate species, processing petitions, and delisting or reclassifications (Tier 2). The guidance assigns the lowest priority (Tier 3) to processing proposed or final designations of critical habitat. Processing of this final rule is a Tier 2 action.

Summary of Comments and Recommendations

In the March 27, 1998, proposed rule (63 FR 14885), the May 14, 1998, public hearing notice (63 FR 26764), and the October 13, 1998, notice reopening the comment period (63 FR 54660), we requested all interested parties to submit factual reports or information that might contribute to the development of a final rule. The original public comment period extended 120 days from the date of the proposal and closed on July 27, 1998. The comment period was reopened for an additional 30 days on October 13, 1998, and closed on November 12, 1998. The second comment period was reopened to accept comments on the proposal after the original comment period closed. Updated information on the distribution and abundance of the species was provided by the TPWD (G. Graham, TPWD, *in litt.* 1998). In addition, a Conservation Agreement for the Devils River minnow among us, the TPWD, and the City of Del Rio was signed on September 2, 1998.

We contacted numerous Federal and State agencies, county and municipal governments, scientific organizations, and private individuals to request comments on the proposal. Newspaper notices inviting public comment and announcing the public hearing were published between May 3 and May 12, 1998, in the *Sanderson Times, Del Rio News Herald, Odessa American, San Angelo Standard Times, Midland Reporter-Telegram, Devils River News,* and the *Ozona Stockman.*

The public hearing was held in Del Rio on May 28, 1998. About 50 people attended, and 18 made oral statements. We also received 13 written comments from the public and agency officials during both comment periods. Four of the oral comments at the public hearing were the same or similar to written comments submitted by the same parties. One person submitted two comment letters. Therefore, comments were received from 26 separate commenters on the proposal.

The following summary addresses the written and oral comments received. These comments comprise a range of issues regarding the proposal. Because multiple respondents offered similar comments in some cases, those comments were combined. Of those commenters stating a position, 11 clearly indicated opposition to the listing and another 8 implied that they were opposed. Seven commenters did not clearly state a position. Ten commenters expressed support for the Conservation Agreement. The comments and our responses are as follows:

Comment 1: There is a need for more information on the Devils River minnow before a decision is made. The distribution and abundance of the fish is likely larger than reported in the proposal, both in the U.S. and Mexico.

Service Response: We agree that more can be learned about the Devils River minnow and its conservation with additional research. The Conservation Agreement has additional research and monitoring as key components for benefitting the species (see the "Background" section of this final rule). However, we must base the listing decision on the best information available at this time. With the current data, we conclude that the fish has declined over a significant portion of its range. Therefore, based on the best available information, threatened status for the Devils River minnow is warranted.

Comment 2: Numerous commenters requested that we accept the Conservation Agreement among the Fish and Wildlife Service, TPWD, and the City of Del Rio in lieu of listing the minnow. Many believed this is a better approach to management of the Devils River minnow.

Service Response: We agree that cooperative, voluntary efforts to conserve this species that remove or reduce threats that preclude the need to list would be preferable to Federal listing. However, full implementation of the conservation strategy activities that the agreement calls for has not occurred. We signed the Conservation Agreement so that conservation efforts could be quickly put in place to reduce the risks to the species' survival. We have considered the extent to which the conservation actions outlined in the Conservation Agreement have been implemented and are likely to reduce threats to the species, particularly in the near-term, in making this listing determination. We strongly support the efforts of State and local agencies taking active roles in the conservation of the Devils River minnow, and we believe the Agreement and actions outlined in it have the potential to benefit the species. The actions already accomplished in the Conservation Agreement, as well as the agreed-upon schedule for implementing the remaining actions, were considered in the decision to list as threatened. We believe that the conservation agreement is an important conservation tool. Even though full implementation has not occurred and we determined that threats to the species still exist such that listing is still warranted, the Conservation Agreement will be useful in facilitating and expediting the recovery of the Devils River minnow.

Comment 3: Some commenters requested the listing decision be delayed to allow the Conservation Agreement time to be implemented.

Service Response: We are required by section 4 of the Act to publish a final decision within one year of a proposed rule. We took into account those actions of the Conservation Agreement that have been implemented to date and the benefits expected from actions that will be implemented in the near future. We determined that, within the statutory time frames mandated by the Act, listing the Devils River minnow as threatened at this time is the best course of action.

Comment 4: Several commenters stated a strong desire to not incur additional Federal regulations over land and water use that would limit private property rights.

Service Response: We do not foresee substantial impacts on private property rights through the Devils River minnow. In the "Available Conservation Measures" section of this final rule, we have outlined some private activities that likely will and likely will not result in take of the species under the prohibitions of section 9 of the Act. We are interested in working with landowners to develop cooperative solutions to species conservation that avoid or minimize the need for regulatory burdens on landowners.

Comment 5: Local and state governmental agencies could manage the Devils River minnow better than the Federal government.

Service Response: Listing the species by the Federal government does not preclude State and local management of the species. On the contrary, we encourage State and local involvement in recovery of endangered species. We believe that local actions are crucial to long-term conservation of this species. We believe a cooperative approach by all parties will provide an even greater benefit to the species, and we offer any support where possible and needed.

Comment 6: No significant groundwater pumping has occurred in the watershed since the 1960's.

Service Response: We took this comment into consideration in this final rule (see discussion in the "Summary of Factors Affecting the Species" section) and have modified the discussion of this topic. Because of the lack of information on groundwater withdrawals, we do not have substantial information showing the level of pumping in and around the Devils River watershed. This prevents any correlation of streamflow with groundwater withdrawals. However, sources such as Dietz (1955) and Brune (1981) claim that groundwater withdrawals have affected stream flows. We believe there is a potential that groundwater pumping could adversely affect habitat of the Devils River minnow.

Comment 7: There have not been any changes in stream flows in the Devils River, and no data exist that suggest otherwise. In addition, there has never been permanent stream flow in the reach from Beaver Lake to Pecan Springs.

Service Response: The information used in evaluating historical stream flow on the Devils River is from gage records collected by the International Boundary and Water Commission at the gage near Del Rio (1900–1957), the gage at Pafford Crossing (1960–1997), and the gage near Juno (1925–1973). We did not locate any specific studies or analysis of hydrology on the Devils River.

We reevaluated all existing and new information concerning the presence of permanent flow between Pecan Springs and Beaver Lake on the Devils River. The "Summary of Factors Affecting the Species" section of this rule reflects the available information. One task included in the Conservation Agreement is an analysis of the hydrology of the Devils River and other streams supporting Devils River minnow to determine if stream flows have declined over time.

Comment 8: No changes in grazing practices have occurred in recent times. Instead, the land is actually in better condition today than in previous times and the only changes have been an increase in the amount of cedar and mesquite.

Service Response: We took this comment into consideration in this final rule (see discussion in the "Summary of Factors Affecting the Species" section) and have modified the discussion of this topic. The proposed rule did not state that land use practices, such as grazing, were known to be a major threat to the Devils River minnow. Instead we cited Brune's (1981) statement that some land use practices, such as overgrazing, that result in the loss of native rangeland grasses on the watershed, could lead to increased runoff and decreased groundwater recharge.

We do not have specific evidence that land use practices are a significant reason for the current decline in the species' distribution and abundance. However, Brune (1981) stated that if upland areas are poorly managed, one long-term effect is an increased rate of rainfall runoff and decreased rates of recharge to the groundwater.

Comment 9: One commenter stated that there have never been any Devils River minnows collected from Beaver Lake or anywhere upstream of Pecan Springs.

Service Response: In September 1973, and March 1974, H. Harrell collected Devils River minnow in Beaver Lake. Voucher specimens are deposited in the Strecker Museum, Baylor University. The 1973 sample contains 14 specimens and the 1974 sample contains 13 specimens of Devils River minnow.

Comment 10: The actual abundance of Devils River minnow is higher than reported in the proposed rule. The recent collections of Devils River minnow from Phillips Creek and Dolan Creek show they are plentiful.

Service Response: The new information on the presence of the Devils River minnow in Phillips and Dolan creeks is included in this final rule. The number of fish in Phillips Creek taken in May 1998, indicated a good population at this site at the time the collections were made. The collections at Dolan Creek are important because the only other collection of the species from this site was one specimen in 1989 (Garrett *et al.* 1992). The two locations in the Devils River drainage are less than 20 river-km (13 river-mi) apart and are not sufficient to alleviate the concern for the status of the species in the Devils River or other portions of its range. The most recent information can only confirm three locations of the species throughout its historical range in the U.S. (these two in the Devils River and one at Del Rio in San Felipe Creek). Although population numbers are important, the determination to list a species is based on the five factors outlined in section 4 of the Act and summarized in this final rule under the "Summary of Factors Affecting the Species" section.

Comment 11: Devils River minnows are rare in the Devils River because of the introduction of smallmouth bass by TPWD.

Service Response: We agree that predation by smallmouth bass could be a significant factor in the decline of Devils River minnow in the Devils River. Identification of the significance of this threat is one of the actions included in the Conservation Agreement (Conservation Action #8).

Comment 12: It is illogical to expect the Devils River minnow population in the Devils River to be reestablished to 1950-levels under today's vastly changed circumstances, such as Amistad Dam.

Service Response: Destruction of the species' habitat, such as what resulted from Amistad Dam, is one of the five factors we are required to consider (See the "Summary of Factors Affecting the Species" section below) when deciding if a species is threatened or endangered. However, when planning recovery, we do not expect to restore populations of Devils River minnow to historical locations because some habitat changes are not reversible. We do believe the Devils River minnow can be protected from extinction through conservation of the remaining ecosystems upon which the species depends. The past habitat destruction only serves to heighten the need for protection and enhancement of suitable habitats remaining for the Devils River minnow.

Comment 13: The Natural Resources Conservation Service (NRCS) requested we remove their agency from the list of Federal agencies that may have actions that require consultation under section 7 of the Act. The NRCS indicated that none of their programs adversely affected the minnow, but served to benefit the minnow by improving habitat.

Service Response: We support the NRCS in assisting landowners with ranching practices that may benefit Devils River minnow habitat. However, we left the NRCS as a potential agency for consultations because the Act mandates that any Federal action that may affect a listed species, even if that effect is beneficial, requires consultation with us under section 7 of the Act. We included language in this final rule (see Available Conservation Measures, below) to explain the requirements of Federal agencies under section 7(a)(1) of the Act.

Comment 14: The proposed rule does not indicate the Devils River minnow is bred or hunted for commercial purposes, or that it moves in interstate commerce. Therefore, the Service lacks authority under the Act pursuant to the Commerce Clause of Article 1, section 8 of the United States Constitution to regulate the Devils River minnow.

Service Response: A recent decision in the United States Court of Appeals for the District of Columbia Circuit (*National Association of Homebuilders* v. *Babbitt*, 130 F. 3d 1041, D.C. Cir. 1997) makes it clear in its application of the test used in the United States Supreme Court case, *United States* v. *Lopez*, 514 U.S. 549 (1995), that regulation of species limited to one State under the Act is within Congress' commerce clause power. On June 22, 1998, the Supreme Court declined to accept an appeal of this case (118 S. Ct. 2340 1998). Therefore, our application of the Act to Devils River minnow, a fish endemic to only two counties in the State of Texas, is constitutional. We have authority under the Act to list the Devils River minnow as threatened and direct its conservation and eventual recovery.

In addition to the reasons supporting the constitutionality of the Act itself that were discussed in *National Association of Homebuilders* v. *Babbitt*, the past, current, and potentially future use of Devils River minnow habitat for agriculture and livestock production, residential development and roads and highways are activities that affect interstate commerce. The specimens of this species in museums around the country directly traveled via the channels of interstate commerce, as well as the scientists and others who have traveled interstate to study or observe the species. Finally, international commerce between the U.S. and Mexico, where the species also occurs, may impact Devils River minnow habitat and is also under the authority of Federal regulation.

Comment 15: The Service is intentionally making untrue, nonscientific statements to serve a political agenda to list the Devils River minnow.

Service Response: In both the proposed rule and this final rule we conducted an objective evaluation of the scientific evidence available to reach a decision on whether the Devils River minnow warrants listing under the Act. Where additional information was submitted to us, we have considered that new information as well. The information upon which this decision is based has been peer reviewed by independent experts outside the Service, as required by our 1994 Peer Review Policy (see discussion below).

Peer Review

Service policy (59 FR 34270; July 1, 1994) requires that we solicit review of listing actions from a minimum of three independent experts. We sent copies of the proposed rule, supporting primary literature, and other information to five independent specialists who have extensive knowledge in the biology and ecology of Devils River minnow or other native fishes. Four of these specialists are currently employed at universities conducting research on fishes and one reviewer is a retired fishery biologist from a state agency, currently serving as Executive Secretary of a scientific society specializing in native fishes of the southwestern U.S. Four peer reviewers responded to our request.

All four reviewers indicated the proposal was consistent with the information available in the scientific literature. Three of the reviewers indicated that the proposal to list the Devils River minnow was clearly supported by the scientific literature, emphasizing that the factors cited in the proposal were real threats to the continued existence of the species. One reviewer pointed out the lack of intensive surveys to determine the exact status of the species as a weakness in the available information. However, we believe that sufficient surveys have been conducted to demonstrate a significant range reduction for the Devils River minnow.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, we determine that the Devils River minnow should be classified as a threatened species. Procedures found at section 4(a)(1) of the Act (16 U.S.C. 1531 *et seq.*) and regulations implementing the listing provisions of the Act (50 CFR part 424) were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Devils River minnow (*Dionda diaboli*) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

[redacted]

The Devils River is the largest segment of the historical documented range of the Devils River minnow. The Devils River from Beaver Lake to its confluence with the Rio Grande is about 127 river-km (79 river-mi) long. At least one-quarter of the total length of the Devils River, from Big Satan Canyon to the Rio Grande, has been permanently lost as potential habitat due to inundation behind Amistad Dam.

One of the most significant losses of Devils River minnow habitat occurred in the lower portion of the Devils River with the impoundment of Amistad Reservoir in 1968. The river downstream of Big Satan Canyon is often inundated by Amistad Reservoir and the river can be affected farther upstream when the reservoir level is high. Backwaters from Amistad Dam have inundated the natural stream habitats, transforming the area from a river to a lake environment. The area is no longer suitable for most native fishes, including Devils River minnow.

Before construction of Amistad Dam, two smaller dams (Devils Lake and Wall Lake) were built in about the 1920's in the lower portion of the stream. However, Devils River minnows were collected in 1953 and 1954 in the spring run habitat that remained. Amistad Reservoir, however, inundated these springs, eliminating the natural environment and suitable habitat for native fish. Also, the construction of the dam created a physical barrier to fish movement that permanently separated the Devils River population of the species from others, such as the population in San Felipe Creek.

Habitat for the species may be affected by inconsistent spring flows in the upstream portion of the Devils River, especially between Pecan Springs and Beaver Lake (about 26 km, 16 mi). The only discharge records in this portion of the river are from a gage near Juno, located downstream of Pecan Springs (International Boundary and Water Commission, unpublished data, *in litt.*, 1997) that was discontinued in 1973 and has no records from 1949 to 1963. The available data from this gage show an average base flow (based on the monthly median discharge) in the range of about 1,982 to 2,832 liters per second (lps) (70 to 100 cubic feet per second (cfs)) from 1925 to 1949 and a range of about 991 to 1982 lps (35 to 70 cfs) from 1963 to 1973.

We based our assessment of the uppermost portion of the river on published observational data. One of the earliest descriptions of the Devils River is from Taylor (1904) who stated the river "rises" at Pecan Springs. It is unclear from this account whether there was any flow upstream of this spring system. However, Brune (1975 and 1981) clearly states that the river once flowed from Beaver Lake, as did other springs downstream from Beaver Lake such as Juno, Headwater, Stein, and San Pedro springs, but has dried in recent times. Brune (1975 and 1981) supports this by—(1) referencing an observation from 1916 that described the Beaver Lake area as a beautiful stream; (2) providing flow data from Beaver Lake in 1925 at 45 lps (1.59 cfs) and in 1939 at 0.38 lps (0.01 cfs); and, (3) recording no surface flow from these springs in 1971 and 1976.

Harrell (1978) collected Devils River minnow from the Beaver Lake area in 1973 and 1974 (specimens in Strecker Museum, Baylor University). This indicates that there was sufficient surface flow in the area during those years to support populations of the fish. However, Harrell (1978) states that during the study period in 1974–75, Pecan Springs was the uppermost flowing surface water connected to the river. Harrell (1978) further states that the upper portion of the Devils River (Beaver Lake to Baker's Crossing) has intermittent flow characterized by numerous rapids (citing Belisle and Josselet 1975).

The available information indicates that the flow of the Devils River upstream of Pecan Springs is intermittent and is connected to downstream surface flows only during wetter climatic conditions. The Devils River minnow has been documented in these areas in the past and, therefore, this reach is considered potential habitat for the species. This habitat is likely also naturally intermittent and may not have been continuously occupied by the fish during recent time.

Observations in 1954 and 1955 suggested a significant increase in irrigation farming from groundwater wells in the area of Juno and the headwaters of the Devils River (Dietz 1955). The result reported by Dietz (1955) was the lowering of the groundwater to a level causing the Devils River to cease flowing for a number of miles below Baker's Crossing. The upper portion of the Devils River is likely the most susceptible to declines in groundwater levels.

Brune (1981) states that agricultural land use practices (specifically the decline of grasses from livestock grazing) both within and north of the watershed of the Devils River may affect aquifer levels and account for a lack of permanent flows from the northern-most springs. Brune (1981) explains that the natural layer of organic mulch that formerly functioned as a topsoil capable of absorbing rainfall has been lost and replaced with barer soils that enhance runoff and limit recharge.

Another cumulative factor may be the expansion of Ashe juniper (*Juniperus ashei*) and Redberry juniper (*Juniperus pinchotti*), both commonly referred to as cedar. These two species have become abundant on the rangeland watersheds of the Devils River due to a number of natural and human factors (Smiens *et al.* 1997). The overabundance of juniper has been cited as a factor that could affect rangeland hydrology (Thurow and Hester 1997). However, definitive data are not available to show that removal of juniper will produce increased groundwater levels in Texas. Studies of juniper removal in other states have not resulted in significant yields to groundwater or stream flows (Thurow and Hester 1997).

Any decline of permanent discharge from springs is a significant threat to Devils River minnow in the Devils River. This threat can be the result of drought and/or human activities that withdraw groundwater or significantly reduce recharge. The downstream portion of the Devils River below Baker's Crossing continues to flow naturally and has been referred to as one of the most pristine rivers in Texas. Because of groundwater reservoirs that support the remaining spring systems, the river maintains a substantial perennial flow in the range of 200 to 400 cfs at the inflow to Amistad Reservoir (unpublished data, International Boundary and Water Commission, *in litt.* 1997).

When spring flows become seasonally intermittent, fish populations are unable to use the stream to fulfill their life history requirements. Declines in base flow of streams also affect fish populations by reducing the total available habitat and thereby intensifying competitive and predatory interactions. For Devils River minnow, decreased stream flows could lead to a population decline due to exclusion from preferred habitats and increased mortality from predation.

The eighth action listed in the Conservation Strategy of the Agreement requires the analysis of past changes in flows throughout the range of the Devils River minnow. These studies will determine the potential effects of flows on habitat for Devils River minnow.

Using relative abundance as an indicator, the Devils River minnow has decreased in abundance in the Devils River over time. The Devils River minnow was the fifth most abundant species of 18 species collected in 1953 at Baker's Crossing (Brown 1955); the sixth most abundant of 23 species in the river in 1974 (Harrell 1978); and one of the least abundant of 16 species in 1989 (Garrett *et al.* 1992). Recent information from Cantu and Winemiller (1997) indicates that the species was still present in the Devils River at the confluence with Dolan Falls in 1994, but only in low numbers (thirteenth most abundant of 27 species). The four collections by Cantu and Winemiller (1997) were extensive surveys over 1 year at the one site near Dolan Falls. Even with this increased effort, only 28 individuals of Devils River minnow, out of 4,470 total fish, were documented. No voucher specimens were maintained to verify these collections.

The decline in abundance within the Devils River can best be documented from collections at the site at Baker's Crossing. Over 60 individuals were collected there in 1953, only one was collected in 1989, and none were collected in 1997.

No Devils River minnow were collected in November 1997, by the TPWD from several locations on the Devils River from Pecan Springs downstream to Finegan Springs, just above Dolan Falls (Gary Garrett, TPWD, *in litt.* 1997). New information received after the proposed rule from additional surveys in 1998 found populations of Devils River minnow in Phillips Creek and Dolan Creek (Gary Graham, TPWD, *in litt.* 1998). Phillips Creek is a very small intermittent tributary to the Devils River that enters from the east, south of Baker's Crossing. No previous collections are recorded from Phillips Creek. Sampling in May 1998, resulted in the collection of about 142 individuals, or about 10 percent of the fishes collected, and was fourth most abundant of the eleven species collected. Despite numerous collection efforts in Dolan Creek, only one individual had previously been collected in this tributary to the Devils River. Sampling in May 1998, resulted in the collection of about 12 individuals.

The Conservation Agreement and subsequent commitments were designed to monitor and improve populations of Devils River minnow in the Devils River. By September 2000, we will establish more (than the two currently known) locations of Devils River minnow in the Devils River with population sizes at least equal to historical levels (such as that found by H.L. Harrell in the 1970's). Threats will be assessed and potential limiting factors in this system addressed, particularly the effects of smallmouth bass and changes in stream flows.

[redacted]

San Felipe Creek constitutes the second largest segment of remaining habitat for Devils River minnow in Texas. Brune (1981) lists San Felipe Springs (including ten separate spring sources) as one of the four largest springs in Texas. Devils River minnow previously occurred in two areas on this stream. The upper area is associated with a series of springs, Head and Lowe springs, several miles upstream of the City of Del Rio, and the lower area is associated with two large springs in Del Rio.

In 1979, Devils River minnow made up about 2 percent of all collections (total of 3,458 fish), and was the seventh most abundant of 16 species in the upper portion of San Felipe Creek. In 1989, no Devils River minnow were collected from this site (Garrett *et al.* 1992). No known collections have been made in this area since 1989. This area of San Felipe Creek (upstream of Del Rio) is privately owned and no information is available to discern why the populations of Devils River minnow in this area have significantly declined. Garrett *et al.* (1992) stated that reduced flow from these springs may have contributed to the reduction in abundance of Devils River minnow. Any further declines in spring flows due to increased withdrawals could negatively affect the Devils River minnow population in this location.

At San Felipe Springs in the City of Del Rio the fish was very rare (less than 1 percent of 1,651 fish collected, and the tenth most abundant of 12 species collected) in 1989 (Garrett *et al.* 1992). Data from 1997 suggest that the Devils River minnow is common in the San Felipe Springs and the urban section of the creek (about 50 individuals were collected for captive study) (Gary Garrett, TPWD, *in litt.* 1997).

The San Felipe Springs are located within the City of Del Rio and may be threatened with future habitat changes from continued urban development. Brune (1981) shows data supporting that the springs have increased their flow since the filling of Amistad Reservoir. The Reservoir is thought to increase flows from San Felipe Springs because the pool elevation of the reservoir is often higher than that of the spring outlet. This situation places hydrostatic pressure on San Felipe Springs through inundated spring openings within the reservoir (Brune 1981). According to Brune (1981), before the reservoir filled, the springs flowed about 2000 lps (about 70 cfs). Since the reservoir filled, flows at the springs have averaged 135 to 150 cfs (unpublished data from International Boundary and Water Commission, *in litt.* 1997). Both of these flow averages are after withdrawals of water by the City of Del Rio for municipal use.

The City of Del Rio draws water directly from San Felipe Springs, which are the sole source of the City's municipal water supply as well as for Laughlin Air Force Base. During 1995 and 1996 the average water use by the City varied seasonally from about 8 to 19 million gallons per day (about 12 to 29 cfs). The expected population growth of Del Rio is projected to be low, 0.5 to 1 percent annually (B. Eby, City of Del Rio, pers. comm., 1997). The City is currently planning to upgrade their water treatment facility and provide a maximum of 20 million gallons per day (about 31 cfs) for municipal use (U.S. Environmental Protection Agency, Finding of No Significant Impact, *in litt.* 1998; O.J. Valdez, Malcom Pirnie, Inc., pers. comm., 1999). This new treatment plant and associated facilities will provide some water conservation because the existing system of water distribution and storage leaks significantly. With additional water conservation measures in place to reduce per capita water use, the City could decrease its water consumption from San Felipe Creek in the future.

Water quality and contamination are inherent threats to the population in San Felipe Creek because of the urban setting. Recent studies by the Texas Natural Resource Conservation Commission (TNRCC; 1994) found elevated levels of nitrates, phosphates and orthophosphate in San Felipe Creek, indicating potential water quality problems. Land uses in the immediate area of the springs, such as runoff from the municipal golf course, may be contributing to these conditions. Other threats from catastrophic events such as contaminant spills could adversely affect the species.

The stream channel of San Felipe Creek in Del Rio has been modified to a limited extent for bank stabilization and public access. In some areas these actions may have limited the available habitat for Devils River minnow.

Based on the current abundance of the Devils River minnow in San Felipe Creek, it appears that existing practices that could impact the aquatic habitat are not yet serious enough to significantly reduce the local population. Aquatic habitat conservation measures (such as water use conservation and water quality protection) in this section of San Felipe Creek could help ensure survival of the species there.

In August 1998, San Felipe Creek experienced a very large flood, with flows estimated at over 100,000 cfs. This was the largest estimated peak flow on record (previous high was about 69,500 cfs). Although the Devils River minnow is adapted to withstand floods (Harrell 1978), the effects of this event are unknown as no collections have been made since the flood.

As part of the Conservation Agreement, by September 2000, we agreed to improve the status of the Devils River minnow in San Felipe Creek by maintaining stable populations at Del Rio and restoring Devils River minnow in the headwater springs area at levels at least equal to historical population sizes. In addition, a finalized policy by the City of Del Rio for preservation of the San Felipe Creek watershed, development of a San Felipe Creek floodplain restoration plan (as response to the flood of August 1998), completion of a water conservation plan, and completion of a management plan for the golf course will reduce threats to the species.

Other actions that may aid in conserving the Devils River minnow include reducing per capita water consumption, seeking alternative sources of water, preserving water quality, educating the public on the importance of the creek, and limiting population density adjacent to the creek. In addition, the City has agreed to consider the needs of the Devils River minnow and its habitat in the reconstruction of those portions of the creek that were damaged in the August 1998 flooding. These actions together will provide an opportunity to protect the existing populations and expand the available habitat for Devils River minnow in San Felipe Creek.

Sycamore Creek

Sycamore Creek constitutes a relatively small portion of the range of the species. There is only one published account of Devils River minnow in this stream from one site, at the State Highway 277 crossing near the Rio Grande River (Garrett *et al.* 1992). Harrell (1980) references the species' occurrence there from an unpublished collection in the early 1970's (H. Harrell, pers. comm. 1997). Garrett *et al.* (1992) found only one individual of Devils River minnow at this location.

Sycamore Creek is an ungaged stream, and there is little information available on habitat conditions. However, the Devils River minnow in this stream is evidently very rare and faces increased risk of extirpation because of the apparent small population size. Devils River minnow in Sycamore Creek likely face potential threats from drought and habitat modification (Garrett *et al.*, 1992). The Conservation Agreement is intended to restore Devils River minnow to Sycamore Creek and/or Las Moras Creek by September 2000. This effort will necessitate further assessment of limiting factors, threat abatement, and landowner cooperation.

Las Moras Creek

Las Moras Creek represents the eastern extent of the range of the species. Although the populations there may have been restricted to the spring area in Brackettville, the number of fish in historical collections was relatively large (54 individuals were collected in 1953) (Hubbs and Brown 1956). The natural spring system in Brackettville that supports Las Moras Creek is the location of the earliest collection of Devils River minnow. The species has not been collected from these springs since the 1950's and is believed to be extirpated from that stream, based on several sampling efforts in the late 1970's and 1980's (Smith and Miller 1986; Hubbs *et al.* 1991; Garrett *et al.* 1992).

Habitat for the Devils River minnow was lost when the spring was altered by damming the outflow and removing streambank vegetation to create a recreational swimming pool. Garrett *et al.* (1992) reported that the creek

maximum of 20 million gallons per day watershed, development of a San Felipe location of the earliest collection of

smelled of chlorine, indicating that the swimming pool may be maintained with chlorination (a toxin to fish). Garrett *et al.* (1992) also indicate that spring flow has been drastically reduced by drought and diversion of water for human consumption. The springs apparently ceased flowing in the 1960's and again in the 1980's (Garrett *et al.* 1992). This combination of habitat loss and alteration and the resulting water quality problems appears to be the most likely cause for the apparent extirpation of the species from Las Moras Creek. The Conservation Agreement is intended to restore Devils River minnow to Las Moras Creek and/or Sycamore Creek by September 2000. This effort will necessitate further assessment of limiting factors, threat abatement, and landowner cooperation.

Mexico

The only known historical locations of the Devils River minnow in Mexico are in the Rio San Carlos and three upper streams of the Rio Salado drainage. The Rio San Carlos is a small tributary of the Rio Grande located 27 km (17 mi) south of Ciudad Acuna. Only a few individuals have been collected from this location, once in 1968 (University of Michigan Museum specimens, unpublished data, 1997) and again in 1974. The species has not been collected from this site since 1974 and its status there is unknown (S. Contreras-Balderas, University of Nuevo Leon, *in litt.* 1997).

The population of Devils River minnow in the Rio Salado drainage of northern Mexico represents a critical portion of the southern-most extent of the range. The Rio Salado is a tributary of the Rio Grande and is geographically distinct from the tributaries where the fish occurs in Texas. Collections of the species are limited to the Rio Sabinas, Rio San Juan, and Rio Alamo from about 8 km (5 mi) northwest of Muzquiz to about 12 km (7 mi) west of Nueva Rosita (S. Contreras-Balderas, University of Nuevo Leon, *in litt.* 1997). Therefore, the known range of the species in the Rio Salado is about 30 km (20 mi). The most recent collections of Devils River minnow (31 individuals) from this area were in 1994 (S. Contreras-Balderas, University of Nuevo Leon, *in litt.* 1997).

The Conservation Agreement includes the survey of Mexican streams that could potentially contain populations of Devils River minnow by September 2000. The likely condition of aquatic habitats in the Rio Salado Drainage in Mexico is extremely poor. Contreras and Lozano (1994) report that aquatic ecosystems in this region of Mexico face significant threats due to groundwater and surface water withdrawals, as well as air and water pollution. Watersheds in northern Mexico have been heavily impacted by land uses and industrial development (S. Contreras-Balderas, University of Nuevo Leon, *in litt.* 1997). The Rio Sabinas, in particular, has been noted for decreasing flows; and spring systems within Coahuila have been extensively exploited (Contreras and Lozano 1994). Contreras-Balderas (1987) considered the Devils River minnow in danger of extinction, and the species is currently listed by the Mexican government as endangered.

Range-Wide

Habitat loss and modification throughout a significant portion of the range of the Devils River minnow has resulted in both the fragmentation and contraction of the range of the species. The previous occurrences of known localities of Devils River minnow in Texas can be grouped into nine geographic areas, primarily associated with spring systems—five areas in the Devils River (lower Devils River, Dolan Falls, Baker's Crossing, Pecan Springs, Juno to Beaver Lake); two areas in San Felipe Creek (headwater springs and Del Rio); one area in Sycamore Creek; and one area in Las Moras Creek.

Of these nine areas, the best available information confirms the existence of Devils River minnow in only Phillips Creek downstream from Baker's Crossing, Dolan Creek (about 20 km away from Phillips Creek), and San Felipe Creek in Del Rio. The known existence of only three localities, with one in an urban setting, makes the status of the species in the U.S. tenuous. However, actions in the Conservation Agreement implemented to date, plus future actions to be implemented according to an agreed-upon schedule, leads us to determine that threatened status is appropriate. Although detailed information is limited regarding the status of the species in Mexico, its legal status and degradation of aquatic habitats indicate it is endangered with extinction in that country.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overutilization is not considered a significant threat to the Devils River minnow. However, there is a potential for impacts should this species be harvested as a baitfish (either commercially or non-commercially).

C. Disease or Predation

The Devils River minnow may be affected by the presence of introduced fishes within its range. Of special concern is the threat of predation by smallmouth bass, a game fish introduced to Amistad Reservoir in about 1975. The smallmouth bass is native to eastern North America but has been widely introduced as a sport fish to reservoirs and streams outside its natural range. It is believed smallmouth bass gained access to the upper portions of the Devils River (upstream of Dolan Falls) in the early to mid-1980's (Gary Garrett, TPWD, pers. comm. 1997). This species is now the dominant predator in the fish community of the Devils River. The TPWD is currently managing the Devils River as a trophy smallmouth bass fishery with size and catch limits.

The Devils River minnow evolved in the presence of native fishes that consume other fishes, such as channel catfish (*Ictalurus punctatus*) and largemouth bass (*Micropterus salmoides*). The Devils River minnow has adapted to persist with these species. However, smallmouth bass are not native, are aggressive predators, and are known to impact other native fish communities (Taylor *et al.* 1984, Moyle 1994). The Devils River minnow is within the size class of small fishes that are susceptible to predation by smallmouth bass. The scarcity of Devils River minnow in the Devils River (where smallmouth bass are prominent) and the abundance of Devils River minnow in San Felipe Creek (where smallmouth bass are not known to occur) provides circumstantial evidence of the likely impacts of this introduced predator. In addition, the small creeks where the Devils River minnow were recently found (Phillips and Dolan creeks) are also not known to contain smallmouth bass. The establishment of smallmouth bass in San Felipe, Phillips, or Dolan creeks is another potential threat to Devils River minnow in those locations.

The tenth action in the Conservation Strategy includes a determination of the interactions between smallmouth bass and Devils River minnow. If results indicate that smallmouth bass are likely having negative effects on Devils River minnow populations, actions such as localized smallmouth bass removal efforts in conjunction with reintroductions of Devils River minnow will be considered. Long-term management of smallmouth bass in the Devils River will be addressed through regulations on catch and size limits to reduce abundance and modify population structures.

D. The Inadequacy of Existing Regulatory Mechanisms

The Devils River minnow is listed as a threatened species by the State of

Texas. This provides some protection from collecting, as a permit is required to collect listed species in Texas. However, there are no State or local regulations to protect habitat for the conservation of the species. In addition, no regulations exist to prevent unintentional releases of exotic species by the baitfish industry and anglers.

Limited State regulations administered by the TNRCC serve to protect in-stream flows for surface water rights and water quality for wildlife and human uses. However, these regulations were not designed to conserve habitat for native fishes and currently no minimum in-stream flows are required on streams where Devils River minnow occur.

Surface water rights along the Rio Grande in Texas and its U.S. tributaries are administered by the State of Texas. Groundwater withdrawals that could be affecting stream flows within the range of the Devils River minnow are unregulated. Texas courts have held that, with few exceptions, landowners have the right to take all the water that can be captured under their land (rule of capture). Therefore, there is little opportunity to protect groundwater reserves within existing regulations.

State Water Quality Standards, though primarily concerned with protecting human health, may provide some protection to the Devils River minnow and its habitat. However, the sensitivity of Devils River minnow to any contaminants or water quality changes is unknown and could require more stringent standards than used for human health. The classification of the Devils River and San Felipe Creek under the Texas Surface Water Quality Standards requires maintenance of existing water quality. Sycamore and Las Moras creeks are not classified under these standards.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Habitat loss throughout the range of the Devils River minnow has reduced the number of known locations to as few as three. The Devils River minnow is currently known to be common in only two locations, Phillips Creek and San Felipe Creek in Del Rio. However, actions identified in the Conservation Agreement that have been implemented to date have reduced the threat of extinction of the Devils River minnow.

If Devils River minnow still occurs in other locations (such as Sycamore Creek, headwaters of San Felipe Creek, and the Devils River), the number of fish may be too small to constitute viable populations (Caughley and Gunn 1996). Small populations can lead to genetic erosion through inbreeding and are vulnerable to loss from random natural events, including population fluctuations (Meffe 1986). The Conservation Agreement is intended to improve population levels and distribution of Devils River minnow throughout its range to reduce these threats.

The construction of Amistad Dam has separated the two primary populations of Devils River minnow in Texas (Devils River and San Felipe Creek). This population fragmentation could have significant conservation implications (Gilpin 1987). Determining and monitoring the genetic structure of the different Devils River minnow populations will be needed to ensure the necessary genetic variation within and among populations is not lost (Meffe 1986; Minckley *et al.* 1991).

Recent collections in 1997 from San Felipe Creek revealed for the first time the presence of armored catfish (*Hypostomus* sp.) (Gary Garrett, TPWD, *in litt.* 1997). This fish is an exotic species that has established a breeding population in the San Antonio River, Texas, and was cited as potentially competing with other *Dionda* species due to its food habitats (Hubbs *et al.* 1978). Although *Dionda* species are common in spring runs in Central Texas, they are now absent from these habitats in the San Antonio River, implying the potential displacement by the armored catfish (R.J. Edwards, University of Texas-Pan American, *in litt.* 1998). This could be a threat to Devils River minnow populations in San Felipe Creek.

The future release (intentional or unintentional) of other fishes into areas inhabited by Devils River minnow is another potential threat. Live bait fish are commonly discarded into nearby waters by anglers, resulting in introductions of non-native species. This situation has occurred in many streams in the southwestern U.S. with considerable impacts to the native fish community (Moyle 1994). In addition, exotic fishes from aquariums could be introduced into local waters. Currently, only a small number of introduced fishes occur within the range of the Devils River minnow, but the potential for unintentional introductions is high because of the number of anglers on the Devils River and the urban setting of San Felipe Creek. Threats to the populations of Devils River minnow from possible introduction and establishment of non-native fishes include diseases, parasites, competition for food and space, predation, and hybridization. The Conservation Agreement has provisions for assessment and monitoring of exotic fishes throughout the range of the Devils River minnow.

The overall decline in abundance of Devils River minnow could be the result of several cumulative factors. For example, subtle changes in stream flows could produce small shifts in habitat use that make the species more vulnerable to competition and predation by native predators and non-native smallmouth bass. In addition, long-term drought could have an effect on the habitat of the species, particularly when combined with impacts of human water use. This species has adapted to historical natural climatic variations (such as large floods and prolonged droughts). However, in conjunction with other threats to the species (primarily existing habitat loss and exotic predators), a drought could significantly increase the threat of extinction. The use of water supplies for human needs (municipal or agricultural) serves to worsen the effects of drought on the natural environment.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this final rule. Therefore, based on this evaluation, the most appropriate action is to list the Devils River minnow as threatened. The species currently inhabits a very limited range and the best scientific information available indicates a significant decline in range and abundance of the species.

Some new information was received since the proposal that suggested habitat loss in the upper reaches of the Devils River may be less severe than originally thought. This is because we originally characterized the habitat as historically a continuous flowing stream, when this upper reach may always have been intermittent; therefore, the habitat may have never been more than marginal. In addition, the discovery of two additional localities of Devils River minnow in tributaries to the Devils River provided information that populations are extant in the Devils River drainage. New information was also provided showing the presence of an additional exotic species in San Felipe Creek that presents a threat not mentioned in the proposed rule.

The Conservation Agreement involving us, the TPWD, and the City of Del Rio provides commitments to work toward the recovery of the species through implementing the 10 actions described in the Conservation Strategy (see "Background" section of this rule). In addition, we have received confirmation from both TPWD and the City of Del Rio of their commitment to implement certain key actions of the

Agreement within the first two years of its signing. However, we can still only confirm three localities where the species remains in the U.S.; habitat loss has been considerable in the Devils River due to Amistad Dam and in Las Moras Creek; and the Conservation Agreement has not yet been fully implemented.

An endangered species is defined under the Act as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. We have carefully examined the best scientific and commercial information available, and determine that threatened status is appropriate for the Devils River minnow.

Critical Habitat

Critical habitat is defined in section 3 of the Act as—(i) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection and; (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" as defined in section 3(3) of the Act means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. Our regulations (50 CFR 424.12(a)) state that designation of critical habitat is not prudent when one or both of the following situations exist—(1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species, or (2) such designation of critical habitat would not be beneficial to the species. We find that the designation of critical habitat for the Devils River minnow is not prudent due to lack of benefit.

The section 7 prohibitions against adverse modification of critical habitat apply to Federal actions only (see the "Available Conservation Measures" section of this rule). The watersheds in the U.S. in which the Devils River minnow occurs are almost entirely in private ownership, and no significant Federal actions affecting the species' habitat are likely to occur in the area. Therefore, the designation of critical habitat would provide little, if any, benefit to the species through section 7 of the Act.

In addition, any Federal action that would cause adverse modification of critical habitat for the Devils River minnow likely would also cause jeopardy for areas where the species is known to occur. Under section 7, actions funded, authorized, and carried out by Federal agencies may not jeopardize the continued existence of a species or result in the destruction or adverse modification of critical habitat. To "jeopardize the continued existence" of a species is defined as an action that appreciably reduces the likelihood of its survival and recovery (50 CFR part 402). "Destruction or adverse modification of critical habitat" is defined as an appreciable reduction in the value of critical habitat for the survival and recovery of a species. Common to both definitions is an appreciable detrimental effect to both the survival and recovery of a listed species. In biological terms and in consultation practice, the jeopardy standard and the adverse modification standard are virtually identical for areas occupied by the species.

For any listed species, an analysis to determine jeopardy under section 7(a)(2) would consider impacts to the species resulting from impacts to habitat. Therefore, an analysis to determine jeopardy would include an analysis closely parallel to an analysis to determine adverse modification of critical habitat. A Federal action that would adversely modify the species' habitat would also jeopardize the species (and vice versa). Specifically for the Devils River minnow, any modification to suitable habitat within the species' range also will substantially affect the species. Actions that may affect the habitat of the Devils River minnow include, but are not limited to—(1) Reduction of water flows from springs or streams, (2) Degradation of water quality, (3) Alteration of shallow, fast-flowing stream areas downstream from the outflow of springs, and (4) Construction of structures that interfere with instream movement of fishes. Given the imperiled status and narrow range of the Devils River minnow, it is likely that any Federal action that would destroy or adversely modify the species' critical habitat would also jeopardize its continued existence.

Apart from section 7, the Act provides no additional protection to lands designated as critical habitat. Designating critical habitat does not create a park or preserve, and does not require or create a management plan for the areas where the species occurs; does not establish numerical population goals or prescribe specific management actions (inside or outside of critical habitat); and does not have a direct effect on areas not designated as critical habitat. A designation of critical habitat that includes private lands would only affect actions where a Federal nexus (such as Federal funding, authorization, or permit) is present and would not confer any substantial conservation benefit beyond that already provided through section 7 consultation.

Because the Devils River minnow is predominantly found in streams flowing through private lands, the cooperation of private landowners is imperative to conserve the Devils River minnow. Designation of critical habitat on private lands could result in a detriment to the species. The regulatory effect of critical habitat designation is often misunderstood by private landowners, particularly those whose property boundaries are included within a general description of critical habitat for a species. In the past, landowners have mistakenly believed that critical habitat designation would prevent development and impose restrictions on the use of their private property. In some cases, landowners have believed that critical habitat designation is an attempt by the government to confiscate their private property. This misconception was evident from public comments received in 1980 on the proposed designation of critical habitat for the Devils River minnow. Several citizens indicated they strongly believed that by designating critical habitat, the Federal government would have the right to trespass on private property, control private land management actions, and even take ownership of private land for the species. As a result of this misunderstanding, fear of critical habitat designation has sometimes reduced private landowner cooperation in efforts to conserve species listed in Texas. For example, fear resulting from talk of possible designation of critical habitat for the golden-cheeked warbler (*Dendroica chrysoparia*) reduced private landowner cooperation in the management of the species. In addition, in the past landowners have specifically denied access to study sites for Devils River minnow (Hubbs and Garrett 1990, Garrett et al. 1992) due to fears of regulation.

Critical habitat designation can sometimes serve to highlight areas that may be in need of special management considerations or protection. However, in the case of the Devils River minnow the TPWD and local landowners are already aware of the areas in need of special management considerations or protection. Because this species was previously proposed for listing in 1978, and critical habitat proposed in 1980 (due to amendements to the Act both proposals were withdrawn on September 30, 1980 (45 FR 64853)), the public has been aware of the distribution of the species and need for conservation for over 20 years. Prior to and following publication of the 1998 proposed rule to list the Devils River minnow (critical habitat was not prudent in the 1998 proposal (63 FR 14885)), we initiated an extensive public outreach effort to inform and educate the general public and interested parties within the range of the species. We sent out press releases to local newspapers, contacted elected officials, Federal, State, and county agencies, and interested parties, including private landowners. A public hearing was held in 1998, with over 40 people from the local public in attendance. The hearing included the sharing of information on areas important to the species. In addition, over the last two years, TPWD has participated in at least three meetings with affected private landowners (more than 30 individuals in attendance at each meeting) to inform them of the need for conservation of the species, as part of the development of the Conservation Agreement with the State and the City of Del Rio.

We have evaluated the potential notification and education benefit offered by critical habitat designation and find that, for the Devils River minnow, there would be no additional benefit over the outreach associated with the proposal, current outreach for this final rule and interagency coordination processes currently in place. Notification and education can be conducted more effectively by working directly with landowners and communities through the recovery implementation process and, where a Federal nexus exists, through section 7 consultation and coordination. Critical habitat designation for the Devils River minnow would provide no additional notification or education benefit.

In summary, we have determined that the designation of critical habitat for the Devils River minnow would not be beneficial to the species. For the Devils River minnow, the section 7 consultation process will produce a jeopardy analysis similar to an adverse modification analysis for critical habitat. We have already provided private landowners and State and Federal agencies with up-to-date information on important areas for the Devils River minnow and we plan to continue to do so. Finally, even if designation of critical habitat for the Devils River minnow would provide some small, incremental benefit to the species, that benefit is outweighed by the possible reduction in landowner cooperation that would facilitate the management and recovery of this species. Based on this analysis, we conclude that designation of critical habitat for the Devils River minnow is not prudent.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation actions by Federal, State, and local agencies, private organizations, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing these interagency cooperation provisions of the Act are codified at 50 CFR part 402. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat, if any has been designated. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Although few Federal agency actions are anticipated, examples of those that may require consultation as described in the preceding paragraph include U.S. Army Corps of Engineers review and approval of activities such as the construction of roads, bridges, and dredging projects subject to section 404 of the Clean Water Act (33 U.S.C. 1344 *et seq.*) and section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 401 *et seq.*) and U.S. Environmental Protection Agency authorization of discharges under the National Pollutant Discharge Elimination System. Other Federal agencies whose actions could require consultation include the Department of Defense, NRCS, the Federal Highways Administration, and the Department of Housing and Urban Development.

In addition, section 7(a)(1) of the Act requires all Federal agencies to review the programs they administer and use these programs in furtherance of the purposes of the Act. All Federal agencies, in consultation with the Service, are to carry out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of the Act.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. The prohibitions, codified at 50 CFR 17.31, in part, make it illegal for any person subject to the jurisdiction of the U.S. to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing permits are described in 50 CFR 17.22, 17.23, and 17.32. Such permits are available for scientific purposes, for the enhancement or propagation or survival of the species, or for incidental take in connection with otherwise lawful activities. For threatened species, there are also permits for zoological exhibition, educational purposes, or special purposes consistent with the purposes of the Act. Information collections associated with these permits are approved under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, and assigned Office of Management and Budget clearance number 1018–0094. For additional information concerning these permits and associated requirements, see 50 CFR 17.32.

It is our policy (59 FR 34272) to identify to the maximum extent practicable at the time a species is listed those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of the listing on proposed and ongoing activities within a species' range. We believe that, based on the best available information, the following actions will not likely result in a violation of section 9:

(1) Normal livestock grazing and other standard ranching practices, such as improving rangeland native grass cover, that do not destroy or degrade Devils River minnow habitat;

(2) Riparian restoration activities that improve the ecological health of native riparian zones along streams and springs, as long as construction activities do not impair Devils River minnow habitat;

(3) Recreational activities such as swimming, canoeing, and fishing, as long as non-native fish or other exotic organisms are not used as bait and released to the stream, and the activities are conducted in such a way as to not damage habitat or negatively affect water quality; and

(4) Actions that may affect Devils River minnow and are authorized, funded or carried out by a Federal agency when the action is conducted in accordance with an incidental take statement issued by us pursuant to section 7 of the Act.

Activities we believe could potentially harm the Devils River minnow and result in "take" include, but are not limited to:

(1) Unauthorized collecting or handling of the species;

(2) Any activities that may result in destruction or significant alteration of habitat occupied by Devils River minnow including, but not limited to, the discharge of fill material, the diversion or alteration of spring and stream flows or withdrawal of groundwater to the point at which Devils River minnow are harmed, and the alteration of the physical channels within the spring runs and stream segments occupied by the species;

(3) Discharge or dumping of pollutants such as chemicals, silt, household or industrial waste, or other material into the springs or streams occupied by Devils River minnow or into areas that provide access to the aquifer and where such discharge or dumping could affect water quality in spring outflows;

(4) Herbicide, pesticide, or fertilizer application in or near the springs and/or stream segments containing the species;

(5) Introduction of certain non-native species (fish, plants, and other) into occupied habitat of the Devils River minnow or areas connected to these habitats; and

(6) Actions that may affect Devils River minnow and are authorized, funded or carried out by a Federal agency when the action is not conducted in accordance with an incidental take statement issued by us pursuant to section 7 of the Act.

In the descriptions of activities above, a violation of section 9 would occur if those activities occur to an extent that would result in "take" of Devils River minnow. Not all of the activities mentioned above will result in violation of section 9 of the Act; only those activities that result in "take" of Devils River minnow would be considered violations of section 9. We recognize that a wide variety of activities would not harm the species, even if undertaken in the vicinity of the species' habitat. Questions regarding whether specific activities would likely constitute a violation of section 9 should be directed to the Field Supervisor, Austin Ecological Services Field Office (see ADDRESSES section). Requests for copies of the regulations regarding listed wildlife and inquiries about prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Region 2, Division of Endangered Species, P.O. Box 1306, Albuquerque, New Mexico 87103–1306 (telephone 505–248–6920; facsimile 505–248–6788).

National Environmental Policy Act

We have determined that Environmental Assessments and Environmental Impact Statements, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining our reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 CFR 49244).

References Cited

A complete list of all references cited herein, as well as others, is available upon request from the Austin Ecological Services Field Office (see ADDRESSES section).

Author: The primary author of this final rule is Nathan Allan, Fish and Wildlife Service (see ADDRESSES section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500, unless otherwise noted.

2. Amend section 17.11(h) by adding the following, in alphabetical order under "FISHES" to the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*		*	*
FISHES							
*	*	*	*	*		*	*
Minnow, Devils River	*Dionda diaboli*	U.S.A. (TX), Mexico	Entire	T	669	NA	NA
*	*	*	*	*		*	*

Dated: September 30, 1999.

Jamie Rappaport Clark,

Director, Fish and Wildlife Service.

[FR Doc. 99-27188 Filed 10-19-99; 8:45 am]

BILLING CODE 4310-55-P

United States Department of the Interior

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Devils River Minnow - Questions and Answers **October 1999**

The U.S. Fish and Wildlife Service lists the Devils River minnow as threatened.

Q: How does this action affect local landowners and communities?

We do not expect actions by local landowners to be negatively affected by the listing. Land use practices were not cited as a primary factor threatening the species. We do hope that local landowners will work with Texas Parks and Wildlife Department to implement the Conservation Agreement to find innovative solutions to improve the stream ecosystems of the Devils River minnow. We are committed to ensuring that conservation efforts to promote the long-term survival of the species are mindful of land and water needs for traditional agricultural operations and municipalities. We believe that land and water conservation actions (for both quality and availability) needed to sustain the Devils River minnow are compatible and beneficial to human uses of the streams where the species occurs.

Q: What is the purpose of the Conservation Agreement?

A Conservation Agreement is a completely voluntary, written agreement between the Service and another party. The objective of a Conservation Agreement is to conserve species that are candidates or proposed for listing under the Endangered Species Act. This is accomplished by participants committing to conservation measures for the species before a species is listed.

The Devils River Minnow Conservation Agreement (Agreement) was signed in September 1998, by the Service, Texas Parks and Wildlife Department and the City of Del Rio. The Agreement was developed with input from local landowners. The objective of the Agreement is "to reduce the potential threats to the species and to stabilize and improve the species populations and the ecosystems upon which they depend." This objective is to be accomplished through the implementation of ten actions described in the Conservation Strategy.

The Agreement was considered in our listing decision. We determined that if the actions outlined in the Agreement are implemented quickly enough to reach agreed upon milestones, then the imminence of the threats to the species will be reduced sufficiently to justify a threatened designation.

Q: Why did the Service list the Devils River minnow as a threatened species?

The Devils River minnow has been a candidate for listing since it was first proposed for listing in 1978. The best available information indicates that the Devils River minnow has declined in abundance and distribution. The species continues to be threatened due to habitat modifications and impacts of nonnative species.

In March 1998, we proposed the Devils River minnow be added to the list as an endangered species. After receiving public comments on the proposal and signing the Conservation Agreement and subsequent commitments with Texas Parks and Wildlife Department and the City of Del Rio, we determined to list the fish as threatened.

Q: How did the Service decide the Devils River minnow should be listed as threatened?

This decision must be made solely on the basis of the best scientific and commercial data available on the distribution, biology, and threats to the species. An "endangered species" is one that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is one that is likely to become an endangered species within the foreseeable future.

The Service considers five factors in assessing threats to a species: 1) present or threatened destruction, modification or curtailment of its habitat or range; 2) over utilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) inadequacy of existing regulatory mechanisms; 5) other natural or manmade factors affecting its continued existence.

The primary reasons for concern for the Devils River minnow are the reduction in the species' range and declines in abundance within the remaining limited range. The combination of restricted range and scarcity of Devils River minnow makes it vulnerable to extinction. Existing threats to the species are most likely associated with: declining quantity and quality of water within Devils River and increasing predation from the introduction of non-native fish species. It is most likely a number of factors acting together to affect the species and its habitat.

Q: How many Devils River minnows are left?

It is impossible to give an exact number of individuals remaining, although results from a 1992 study showed the species is very rare throughout the remainder of its range. This comprehensive study found only 7 Devils River minnows at 24 sampling locations. The minnow is much less common now, compared to other studies in the 1950s and 1970s.

The Devils River minnow is now only found in tributaries of the Devils River and in San Felipe Creek. The species may still occur in Sycamore Creek in Texas, but no recent surveys have been done. In Mexico the species is only found in one area. The Devils River minnow has been eliminated from the lower portion of the Devils River due to Amistad Dam and from Las Moras Creek in Brackettville due to changes in the spring.

The most recent surveys by the Texas Parks and Wildlife Department, in 1997 and 1998, found the Devils River minnow to be common in San Felipe Creek in the Del Rio area, but were unable to find any Devils River minnows in several locations on the Devils River. The fish was collected in Phillips Creek and Dolan Creek, small tributaries of the Devils River. These are the only three confirmed locations of the species in Texas.

Q: What happens next?

The listing of the species becomes effective 30 days after publication of the notice in the Federal Register. This will implement protection of the species under the Endangered Species Act. Actions that may be prohibited because they result in "take" of the Devils River minnow are described in the Final Rule under "Available Conservation Measures" section, and in the attached Fact Sheet.

We plan to complete a Recovery Plan for Devils River minnow within 2 years of the Final Rule. We will appoint a Recovery Team to draft the plan. The purpose of the Recovery Plan is to identify the conservation actions needed to recover the species. The Conservation Agreement will provide a foundation for developing the Recovery Plan and will include public comment and peer review by technical experts.

Q: Will the Devils River Minnow be listed in Mexico, as well as the U.S.?

Yes, this listing will cover the entire population of Devils River Minnow in the U.S. and Mexico, and will result in the regulation of imported specimens to the U.S. The Service received a letter from the Mexican government responding to the proposed rule that they agreed with the listing action. The species is already listed and covered in Mexico under Mexican rules and regulations.

Q: What can be done about predation from smallmouth bass in the Devils River?

The tenth action in the Conservation Strategy includes a determination of the interactions between smallmouth bass and Devils River minnow. If results indicate that smallmouth bass are likely having negative effects on Devils River minnow populations, actions such as localized smallmouth bass removal efforts in conjunction with reintroductions of Devils River minnow will be considered. Long-term management of smallmouth bass in the Devils River will be addressed through state regulations on bag and size limits to reduce abundance and modify population structures.

These studies are ongoing by Texas Parks and Wildlife Department. Good supporting scientific information from these studies will be necessary to justify any changes in management of the smallmouth bass fishery in the Devils River.

Q: Are we doing anything about the habitat loss in Bracketville from the swimming pool on Las Moras Creek?

The rule states: "The Conservation Agreement is intended to restore Devils River minnow to Las Moras Creek and/or Sycamore Creek. This effort will necessitate further assessment of limiting factors, threat abatement, and landowner cooperation."

The Service plans to protect the minnow where it still exists, before trying to restore habitats that have not been occupied for more than 30 years.

United States Department of the Interior

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Devils River Minnow - Fact Sheet **October 1999**

The Fish and Wildlife Service (Service) lists the Devils River minnow as threatened.

BIOLOGY & DISTRIBUTION

The Devils River minnow eats mostly algae. They reproduce by females releasing many small eggs into the water at the same time males release sperm. The fertilized eggs drift to the bottom, but are not adhesive. We do not know very much about the life history of these fish due to the lack of detailed scientific studies.

The Devils River minnow was historically (pre-1980) known to occur in Texas in Las Moras Creek in Brackettville, in Sycamore Creek at the State Highway 277 bridge, in San Felipe Creek in Del Rio and headwater springs, in the Devils River from near the confluence with the Rio Grande upstream to Beaver Lake north of Juno.

The Devils River minnow was historically (pre-1980) known to occur in Mexico in the Rio San Carlos due south of Del Rio, 27 km (17 mi) south of Ciudad Acuna, and in the Rio Salado Drainage (Rio Sabinas, Rio San Juan, and Rio Alamo) from about 8 km (5 mi) northwest of Muzquiz to about 12 km (7 mi) west of Nueva Rosita.

The most recent collections of Devils River minnow can only confirm populations in San Felipe Creek in Del Rio, in two small tributaries of the Devils River, and (possibly) in the Rio Salado Drainage in Mexico.

PAST ACTIONS

The Fish and Wildlife Service proposed the Devils River minnow for listing as threatened in 1978 with critical habitat proposed for portions of San Felipe Creek and the Devils River. The Service withdrew the proposal in 1980 and the species remained a candidate species since then.

The Service published a proposal to list the Devils River minnow as endangered on March 27, 1998. The Service accepted comments during two public comment periods (total of 150 days) and at a public hearing held in Del Rio on May 28, 1998.

THREATS & HABITAT

The Devils River minnow was eliminated from Las Moras Creek sometime before 1980. Likely due to periodic failure of the springs from drought and groundwater pumping and from modifications to the spring to construct and maintain a swimming pool.

When Amistad Dam was completed in 1968 it transformed the lower third of the Devils River from a river system to a lake system. This change eliminated most of the native fish community in the river, including the Devils River minnow.

The Devils River is considered one of the most pristine rivers in Texas because it is not dammed in the upper portion, and is relatively clean due to its remote location. Protecting the integrity of this exceptional resource is not only beneficial for the Devils River minnow but to other fish and wildlife, as well as the people, who depend on the river.

Smallmouth bass were stocked into Amistad Reservoir to facilitate a recreational fishery. Sometime in the 1980's the nonnative fish became established in the upper Devils River, above Dolan Falls. Smallmouth bass are known to be aggressive predators, eating smaller fish. Smallmouth bass may be a cause for the decline of the Devils River minnow in the Devils River. The three confirmed locations of Devils River minnow in Texas do not contain smallmouth bass.

Much of the water for San Felipe Creek comes from two large springs (San Felipe Springs) within the city of Del Rio. The City also gets its municipal water supply from San Felipe Springs. The quantity of flow from these springs has increased since the impoundment of Amistad Reservoir, as the springs are at a lower elevation than the reservoir. Conserving the quantity and quality of water from the springs is critical for Devils River minnow and the citizens of Del Rio.

CONSERVATION AGREEMENT

The Devils River Minnow Conservation Agreement was signed by the Service, Texas Parks and Wildlife Department (Department) and the City of Del Rio in September 1998. This was a culmination of a year-long coordinated effort to produce the Agreement. The Department worked closely with local landowners to develop conservation actions that were acceptable to them and beneficial to the species. The conservation actions in the Agreement include: determining the current status of the species throughout its range, maintaining captive populations for reintroductions in nature, protection of the San Felipe Creek watershed, providing technical assistance to landowners on riparian protection and management, reviewing live bait harvest and selling practices in the Devils River area to prevent the further establishment of exotic, aquatic species and additional population and habitat monitoring and ecological research including interactions between Devils River minnow and smallmouth bass.

One motivation for the Conservation Agreement was to remove the threats to the Devils River minnow sufficiently so that protection under Federal law was not necessary. The Service carefully considered the Agreement and to what extent it had been implemented as of the time the listing decision was due. The Service concluded that with an accelerated implementation schedule, a determination of threatened rather than endangered would be appropriate.

EFFECTS ON LANDOWNERS

The Service does not expect that the decision to list the Devils River minnow will result in additional regulations for actions on private lands. The normal ranching operations in the range of the Devils River minnow are not expected to negatively affect the species. However, we believe private landowners can benefit habitat of Devils River minnow by taking measures to protect riparian corridors and water quantity and quality in the streams.

Activities that result in "take" are prohibited under section 9 of the Endangered Species Act (Act) without a permit. The Service provided guidance in the Final Rule on activities that may or may not result in "take" of the Devils River minnow. We believe that, based on the best available information, the following actions will **not** result in a violation of section 9:

(1) normal livestock grazing and other standard ranching practices that do not destroy or degrade Devils River minnow habitat, such as improving rangeland native grass cover;

(2) riparian restoration activities that improve the ecological health of native riparian zones along streams and springs, as long as construction activities do not impair Devils River minnow habitat or harm or harass the fish;

(3) federally-approved projects that involve activities conducted in accordance with any reasonable and prudent measures given by the Service in accordance with section 7 of the Act;

(4) recreational activities such as swimming, canoeing, and fishing, as long as non-native fish or other exotic organisms are not used as bait and released to the stream, and the activities are conducted in such a way as to not damage habitat or negatively affect water quality.

Activities we believe could potentially harm the species and result in "take" include, but are not limited to: (1) unauthorized collecting or handling of the species;

(2) any activities that may result in destruction or significant alteration of habitat occupied by Devils River minnow including, but not limited to, the discharge of fill material, the diversion or alteration of spring and stream flows or withdrawal of groundwater to the point at which Devils River minnow are harmed, and the alteration of the physical channels within the spring runs and stream segments occupied by the species;

(3) discharge or dumping of pollutants such as chemicals, silt, household or industrial waste, or other material into the springs or streams occupied by Devils River minnow or into areas that provide access to the aquifer and where such discharge or dumping could affect water quality in spring outflows;

(4) herbicide, pesticide, or fertilizer application in or near the springs and/or stream segments containing the species; and

(5) introduction of certain non-native species (fish, plants, and other) into occupied habitat of the Devils River minnow or areas connected to these habitats.

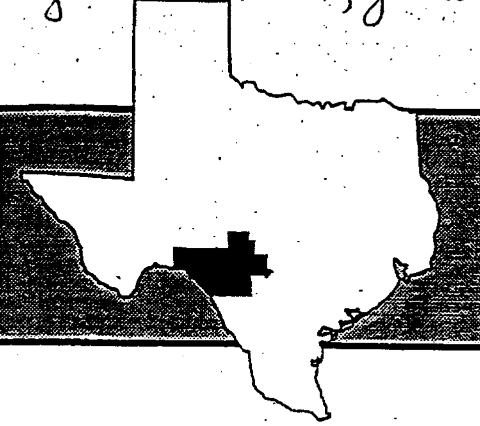
In the descriptions of activities above, a violation of section 9 would occur if those activities occur to an extent that would result in "take" of Devils River minnow. Not all of the activities mentioned above will result in violation of section 9 of the Act; only those activities that result in "take" of Devils River minnow and do not have a permit under sections 7 or 10 of the Act would be considered violations of section 9. We recognize that a wide variety of activities would not harm the species, even if undertaken in the vicinity of the species habitat.

T:SE - Ancistrocactus tobuschii, bio & background
TPWD fact sheet
Original in Plants, general

Federally and State Endangered

Tobusch Fishhook Cactus

Ancistrocactus tobuschii

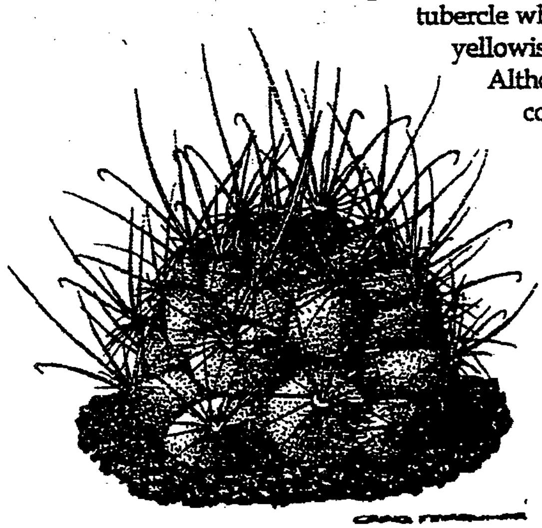


Tobusch fishhook cactus (*Ancistrocactus tobuschii*) was listed as endangered by the U. S. Fish and Wildlife Service (USFWS) in November 1979, and listed endangered by the State of Texas in April 1983. Tobusch fishhook cactus is endemic to the Edwards Plateau of central Texas and is known to occur in Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties. As of February 1996, a total of 33 naturally occurring populations had been verified within the last 10 years. Additionally, there are 13 historically known populations (i.e., not verified within the last 10 years). Populations are known from both public and private land.

Tobusch fishhook cactus is a small, low-growing member of the cactus family (Cactaceae). This species gets its name from Mr. Henri Tobusch, who, in 1951, was the first person to ever collect the species. "Fishhook cactus" which is the Latin translation of *Ancistrocactus*, is a descriptive term reflecting the long hooked spines which project out from the stem of the cactus resembling a fishhook. The Tobusch fishhook cactus can be very difficult to locate. It tends to grow secretly nestled within grasses, spikemoss, and rock fractures. Because of this cryptic nature, often this species can only be pinpointed when it is blooming. Unlike other flowering plants which are principally identified by flower and fruit morphology, cacti are identified primarily by their spine clusters. Therefore, it is important to look critically at the spines (in addition to other key characters) of a cactus that you think may be a Tobusch fishhook cactus.

Identification

The stem of Tobusch fishhook cactus is usually a solitary, dark green, flattened hemisphere, growing up to 10 centimeters (4 inches) in diameter and height. The stem is covered with pyramidal-shaped projections called tubercles which range in size from 9 to 12 millimeters (approximately ½ inch) long. Each tubercle has a shallow groove on the upper surface ending at the spine cluster. The tip of the tubercle where the spines originate is called the areole. The spines are yellowish, sometimes red-tipped, and turn gray with age. Although difficult to discern in the field, the spines are also covered with microscopic hairs. There are two types of spines: the inner or central spines; and, the outer or radial spines. There are 3 to 5 central spines and 7 to 9 (to 12) radial spines per areole. The central spines tend to project three-dimensionally from the stem of the cactus whereas the radial spines lie in a flat plane beneath the centrals. Of the three to five central spines, the upper two form an erect "V". These spines are up to 4 centimeters (1½ inches) long. Sometimes one or two smaller centrals will come up in the middle of the "V", giving the appearance of a "W". The lower perpendicular or ascending central spine is stout, up to 2.5 centimeters (1 inch) long, with sharp hooked tip. The straight, needle-like radial spines are shorter than the central spines (1.5 to 2 centimeters or approximately ¾ inch long) and spread irregularly from the areole.



1 cm

Tobusch Cactus

Reproduction

Flowering of the Tobusch fishhook cactus can begin as early as mid-January in the southern-most populations, with populations throughout the range in full flower in February. Flowering ends by late March. The flowers are clear, bright yellow, although sometimes they may be a creamy yellow or yellowish-green (especially upon opening), turning golden-yellow with age. Within the flower, the stigma sits higher than the stamens. The stigma has 5 to 9 lobes which are green, yellow or whitish. The filaments (the stems of the stamens) are cream to yellowish in color, and the anthers are pale orange to golden yellow. The elongate, egg-shaped fruits are green with a rosy pink tinge and are fully mature by May. The fruits are approximately 2.5 centimeters (1 inch) long with 2 to 6 small scales. Within the fruit are approximately 30 to 60 tiny black seeds and pulp. Almost immediately after a mature fruit splits open, small reddish-brown ants (usually *Forelius foetidus*) swarm the ripe fruits and transport seeds and pulp great distances from the plant to their mounds. These tiny ants may account for as much as 85% of the seed dispersal of the species. The remaining 15% of seeds are dispersed near the plant mostly by gravity and rain. A very small percentage of the seeds are dispersed by mammals and birds that have eaten the fruits.

The Tobusch Fishhook Cactus Imposter

Don't be fooled! An extremely similar species occurs with Tobusch fishhook cactus on the western edge of its distribution–*Ancistrocactus brevihamatus*. Although *A. brevihamatus* is usually taller, with a more pronounced globular or columnar stem at maturity, seedling and juvenile stage *A. brevihamatus* can, at first glance, look like Tobusch fishhook cactus. *A. brevihamatus* has 4 to 6 central spines, and 12 to 14 radial spines. Although *A. brevihamatus* generally has more spines per tubercle than Tobusch fishhook cactus, the spine number overlap creates confusion. The easiest way to distinguish between the two species is when they are flowering. The flowers of *A. brevihamatus*, which do not open completely, are greenish with an olivaceous-rosy hue or overtone. The flowers of Tobusch fishhook cactus, which will eventually open completely, are a bright, clear greenish-yellow to golden-yellow color. Additionally, *A. brevihamatus* has 10 to 11 pinkish stigma lobes and pinkish filaments, as compared to *A. tobuschii* which has 5 to 9 whitish-yellow stigma lobes and whitish-yellow filaments.

Habitat

Tobusch fishhook cactus habitat consists of patchy openings scattered within a mosaic of woodlands, shrublands, and grasslands. Tobusch fishhook cactus tends to occur on very shallow gravely soil over flaggy limestone within openings among live oak-juniper woodlands. Such sites are usually open with only herbaceous cover such as grasses and forbs, although individual Tobusch fishhook cacti may be somewhat protected by rocks, grasses, or spikemoss (*Selaginella* spp.). The soils are moderately alkaline, rocky loams, clay loams, or clays classified as the Tarrant, Ector, or Eckrant series. Habitat geology tends to be fractured limestone, usually of the Edwards or an equivalent formation. Typical plant communities at these sites are curly mesquite-sideoats grama, ashe juniper-oak, and pinyon pine-oak. Habitat sites are usually on level to slightly sloping hill or ridge tops, and occasionally on ledges or other relatively level areas on steeper slopes. Infrequently, this species also occurs along floodplains and gravels along creek bottoms.

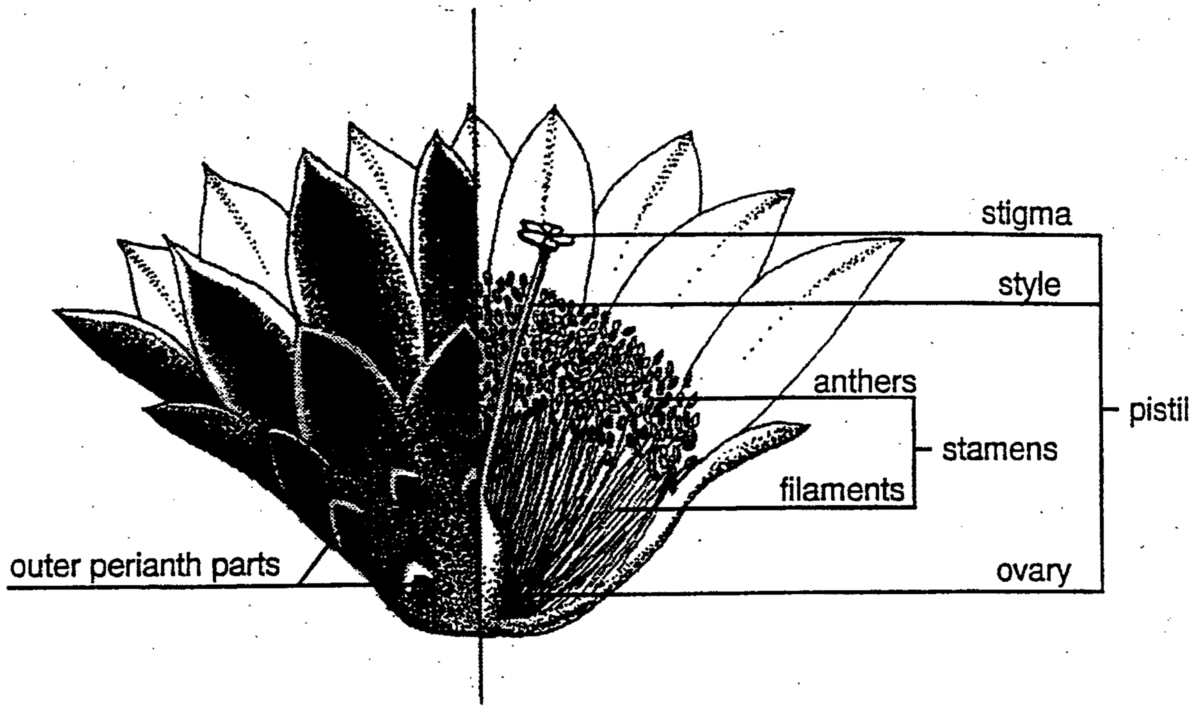
How Can You Help?

Today, Texas Parks and Wildlife Department is taking an in-depth look into the status of Tobusch fishhook cactus. Recently we began receiving reports that this species may not be as rare as we once thought. We would like to invite anyone who is interested to help us gather information on the occurrences of this secretive cactus. Please call us if you have any information that you think would be helpful to our study. With each new population that we can verify, the closer we are to being able to recover and delist this species.

Please Contact:

Jackie M. Poole &/or Gena K. Janssen
Endangered Resources Branch
Texas Parks and Wildlife Department
3000 IH 35 South, Suite 100
Austin, Texas 78704
1 (800) 792-1112 (Press Ext. 71 anytime during the recording.)
1 (512) 912-7011

PWD LF R3000-019B (2/98)


stigma
style
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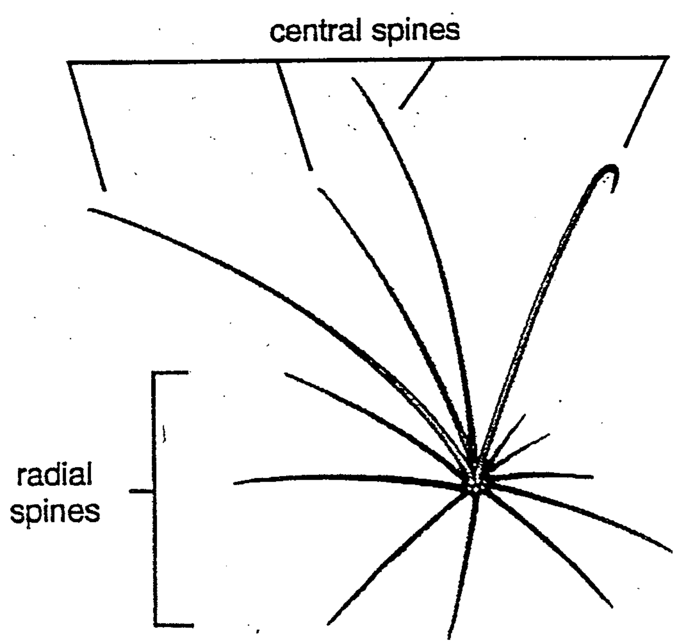
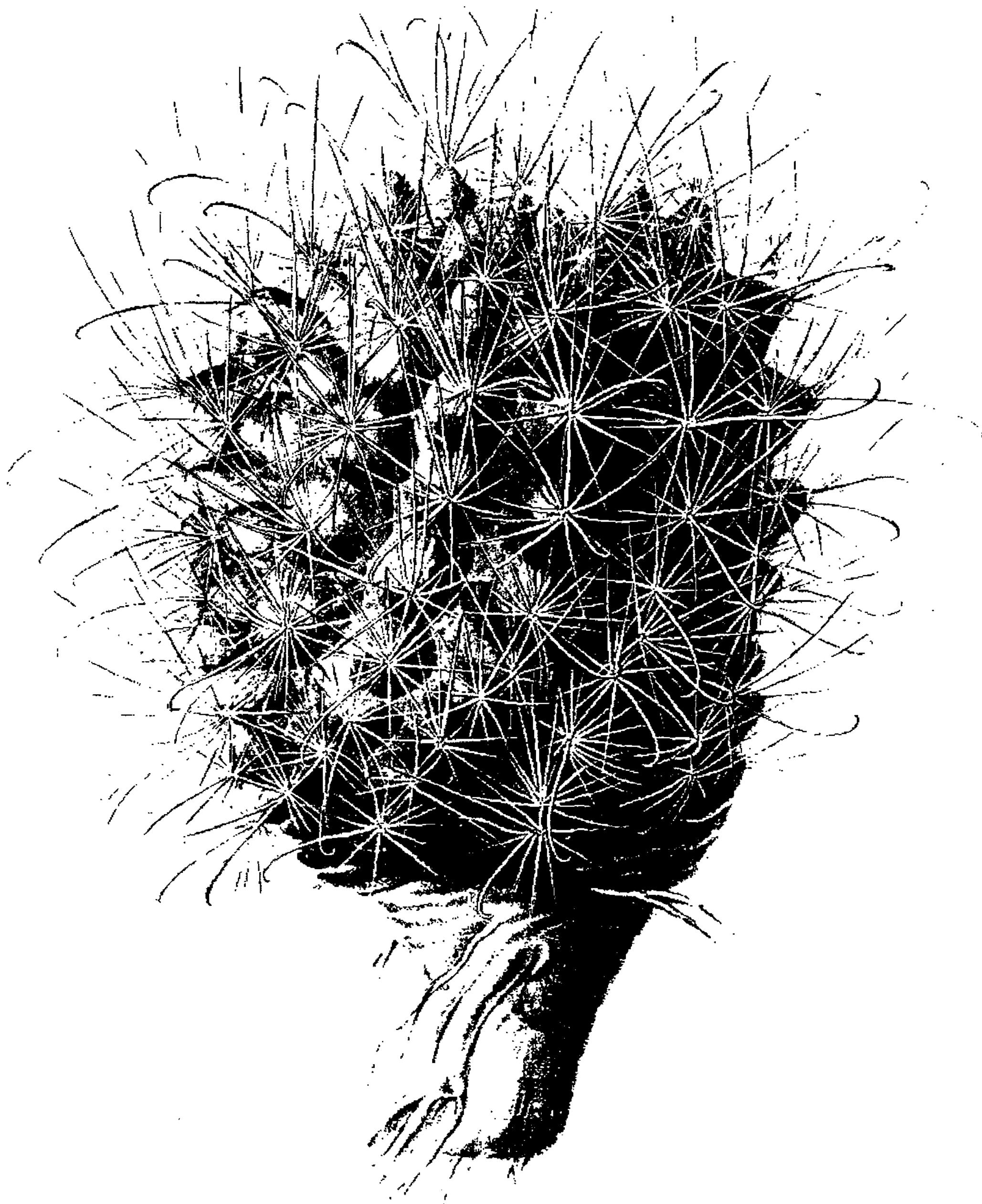
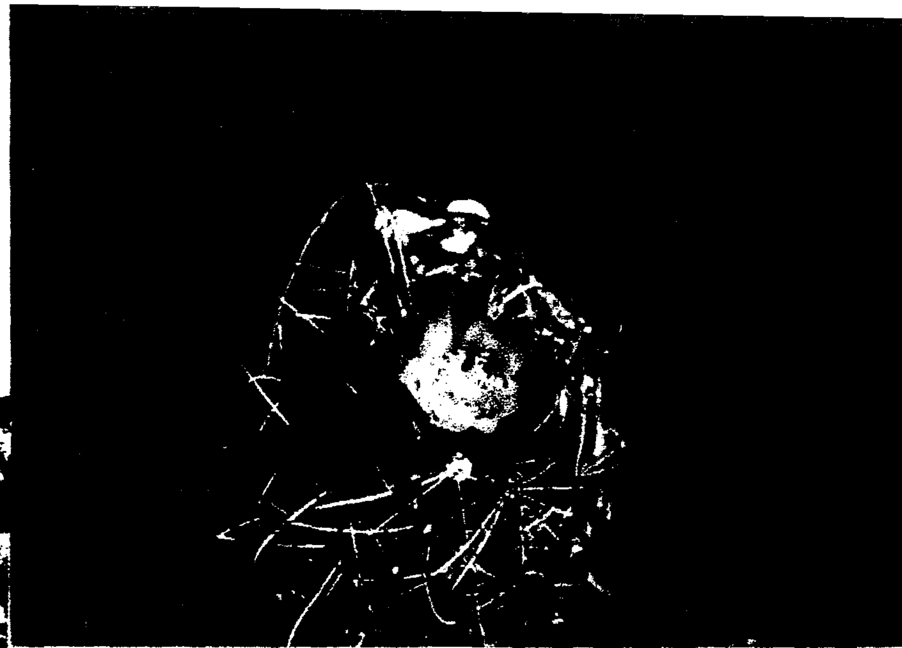

central spines
radial
spines



ECHINOCACTUS BREVIHAMATUS

Tobusch Fishhook Cactus (TFC)
(*Ancistrocactus tobuschii*) and relative
Top Left: TFC typical microhabitat with blooming individuals
Bottom Left: TFC habitat with grassy, rocky openings
Top Right: TFC, note color of petals and stigma
Middle Right: Right plant is TFC, left plant is a relative (A. brevihamatus) for comparison
Bottom Right: relative (A. brevihamatus), note color of petals and stigma



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300
October 18, 2001

REPLY TO
ATTENTION OF

Planning, Environmental and Regulatory Division

SUBJECT: Proposed Programmatic Environmental Assessment (PEA) for the Installation and Operation of Remote Video Surveillance (RVS) Systems

Texas Parks and Wildlife Department
Wildlife Diversity Program
ATTN: Ms. Celeste Brancel-Brown
3000 State IH-35, Suite 100
Austin, TX 78704

Dear Ms. Brancel-Brown:

The U.S. Army Corps of Engineers, Fort Worth District, is acting for the U.S. Immigration and Naturalization Service (INS) in preparing a Programmatic Environmental Assessment (PEA) for the installation and operation of Remote Video Surveillance (RVS) systems for the Central region of the Immigration and Naturalization Service (INS), U.S. Border Patrol (USBP). This PEA will be prepared to address the acquisition, installation, and operation of RVS systems along the U.S./Mexican and U.S./Canadian borders. The objective is to develop a checklist of items that, if satisfied, would allow RVS systems to be installed using categorical exclusions (CATEX) contained in INS' implementation regulations for the National Environmental Policy Act (NEPA) and the INS NEPA Desk Guide.

We are currently in the process of gathering the most current information available regarding state listed species potentially occurring within those counties along the border: Cameron, Hidalgo, Starr, Zapata, Webb, Maverick, Kinney, Val Verde, Terrell, Brewster, Presidio, Jeff Davis, Hudspeth, and El Paso Counties. The USACE respectfully requests that your agency provide a list of the protected species of these counties along with a description of the sensitive resources (e.g., rare or unique plant communities, threatened and endangered and candidate species, etc.) that you believe may be affected by the proposed INS activities. Any information you may have regarding proposed species, potential or known presence, critical habitat, general habitat descriptions, distribution, and status of these species would also be greatly appreciated. To better assess potential impacts to these species, we would like to present as much data in a GIS format as possible. Any GIS information, or information sources, you could provide regarding current distribution of protected species would also be appreciated. Additionally, any past Biological Opinions prepared by the USFWS for these species would be very helpful.

We intend to provide your agency with a copy of the Draft PEA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft PEA.

Your prompt attention to this request would be greatly appreciated. If you have any questions, please feel free to contact Mr. Charles McGregor at (817) 978-6382.

Sincerely,

William Fickel, Jr.
Planning, Environmental and
Regulatory Division

Copy Furnished:

Mr. Mike Schulze
Gulf South Research Corporation
P.O. Box 83564
Baton Rouge, LA 70884-3564

TEXAS PARKS & WILDLIFE

December 18, 2001

Mr. William Fickel
Department of the Army
Fort Worth District, Corps of Engineers
Planning, Environmental, and Regulatory Division
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. Fickel:

This letter is in response to your review request, dated October 18, 2001, for potential impacts to rare and threatened and endangered (T&E) species as a result of proposed installation and operation of Remote Video Surveillance (RVS) systems for the Immigration and Naturalization Service (INS) Central Region, including Cameron, Hidalgo, Starr, Zapata, Webb, Maverick, Kinney, Val Verde, Terrell, Brewster, Presidio, Jeff Davis, Hudspeth, and El Paso counties in Texas.

TPWD recommends the enclosed applicable county list(s) of rare and T&E species be reviewed because species could be present in a project area depending upon habitat availability. If additional county lists are needed, please contact our office at (512) 912-7011. Complete lists of animal and plant species and plant communities tracked by TPWD are also enclosed for your reference. Additionally, information on TPWD county lists and the Texas Biological and Conservation Data System (BCD) is also enclosed.

Given the small proportion of public versus private land in Texas, the BCD does not include a representative inventory of rare resources in the state. Although it is based on the best data available to TPWD regarding rare species, the data from the BCD do not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features in the project areas. These data cannot substitute for an on-site evaluation by qualified biologists. The BCD information is intended to assist the applicant in avoiding harm to species that may occur on the project sites.

Adverse impacts to rare and T&E species could occur as a result of proposed project activities associated with RVS system installation and operation in the above counties. TPWD recommends precautions be taken to avoid adverse impacts to rare or T&E plant or animal species found within or near a proposed project area.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512-389-4800
www.tpwd.state.tx.us

Additionally, because proposed projects could impact rare and T&E species and fish and wildlife habitats, TPWD recommends all projects be sent to TPWD for review. For rare and T&E species reviews, projects may be submitted to: Celeste Brancel-Brown, TPWD Wildlife Habitat Assessment Program, 3000 South IH-35, Suite 100, Austin, TX 78704. To submit a project for review of general fish and wildlife habitat impacts, please send projects to: Kathy Boydston, TPWD Wildlife Habitat Assessment Program, 4200 Smith School Road, Austin, TX 78744. When submitting a project for a T&E review, please use the enclosed "Threatened and Endangered Species Review" form. Using this form is valuable when reviewing projects, allows for a more focused review, and often expedites the review process. If you would like this form sent to you electronically, please contact me.

This letter does not constitute a general review of fish and wildlife impacts that might result from the activity for which this information is provided. Should you need such a review, contact Kathy Boydston, TPWD Wildlife Habitat Assessment Program, Wildlife Division (512) 389-4571.

Your request for BCD information in a GIS data format has been forwarded to Gareth Rowell at the TPWD Wildlife Diversity Program. You may contact Mr. Rowell at (512) 912-7053 concerning this request.

Thank you for the opportunity to comment on this project. If you have any questions or need additional assistance, please do not hesitate to contact me at (512) 912-7054.

Sincerely,

Amy Sugeno, Habitat Review Assistant
Wildlife Habitat Assessment Program, Wildlife Division
Threatened and Endangered Species

Enclosures

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
*** AMPHIBIANS					
BUFO HOUSTONENSIS	HOUSTON TOAD	G1	S1	LE	E
EURYCEA LATITANS	CASCADE CAVERNS SALAMANDER	G3	S3		T
EURYCEA NANA	SAN MARCOS SALAMANDER	G1	S1	LT	T
EURYCEA NEOTENES	TEXAS SALAMANDER	G1	S1		
EURYCEA PTEROPHILA	BLANCO RIVER SPRINGS SALAMANDER	G2	S2		
EURYCEA RATHBUNI	TEXAS BLIND SALAMANDER	G1	S1	LE	E
EURYCEA ROBUSTA	BLANCO BLIND SALAMANDER	G1	S1		T
EURYCEA SOSORUM	BARTON SPRINGS SALAMANDER	G1	S1	LE	E
EURYCEA ~~SP 1~~ tonkawae	JOLLYVILLE PLATEAU SALAMANDER	G1	S1		
EURYCEA ~~SP 2~~ chisholmensis	SALADO SPRINGS SALAMANDER	G1	S1		
EURYCEA ~~SP 5~~ naufragia	GEORGETOWN SALAMANDER	G1	S1	C	
EURYCEA SP 6	PEDERNALES RIVER SPRINGS SALAMANDER	G1	S1		
EURYCEA SP 7	EDWARDS PLATEAU SPRING SALAMANDERS	G1G3Q	S1S3		
EURYCEA SP 8	COMAL SPRINGS SALAMANDER	G1Q	S1		
EURYCEA TRIDENTIFERA	COMAL BLIND SALAMANDER	G1	S1		T
EURYCEA TROGLODYTES	VALDINA FARMS SINKHOLE SALAMANDER	GH	SH		
HYPOPACHUS VARIOLOSUS	SHEEP FROG	G5	S2		T
LEPTODACTYLUS LABIALIS	WHITE-LIPPED FROG	G5	S1		T
NOTOPHTHALMUS MERIDIONALIS	BLACK-SPOTTED NEWT	G1	S1		T
THODON SERRATUS	SOUTHERN REDBACK SALAMANDER	G5	S1		
RANA GRYLIO	PIG FROG	G5	S2		
RANA PIPIENS	NORTHERN LEOPARD FROG	G5	S1		
RHINOPHRYNUS DORSALIS	MEXICAN BURROWING TOAD	G5	S2		T
SIREN SP 1	SOUTH TEXAS SIREN (LARGE FORM)	G?Q	S?		T
SMILISCA BAUDINII	MEXICAN TREEFROG	G5	S3		T
*** ARACHNIDS					
ARCHEOLARCA GUADALUPENSIS	GUADALUPE CAVE PSEUDOSCORPION	G1	S1		
CICURINA BANDIDA	BANDIT CAVE SPIDER	G1	S1		
CICURINA BARONI	ROBBER BARON CAVE SPIDER	G1	S1	LE	
CICURINA CUEVA	A CAVE SPIDER	G1	S1		
CICURINA MADLA	MADLA'S CAVE SPIDER	G1	S1	LE	
CICURINA VENII	VENI'S CAVE SPIDER	G1	S1	LE	
CICURINA VESPERA	VESPER CAVE SPIDER	G1	S1	LE	
CICURINA WARTONI	WARTON'S CAVE SPIDER	G1	S1	C1	
NEOLEPTONETA MICROPS	GOVERNMENT CANYON CAVE SPIDER	G1	S1	LE	
NEOLEPTONETA MYOPICA	TOOTH CAVE SPIDER	G1	S1	LE	
TARTAROCREAGRIS TEXANA	TOOTH CAVE PSEUDOSCORPION	G1	S1	LE	
TEXELLA COKENDOLPHERI	ROBBER BARON CAVE HARVESTMAN	G1	S1	LE	
TEXELLA REDDELLI	BEE CREEK CAVE HARVESTMAN	G1	S1	LE	
TEXELLA REYESI	BONE CAVE HARVESTMAN	G1Q	S1	LE	
*** BIRDS					
AIMOPHILA AESTIVALIS	BACHMAN'S SPARROW	G3	S3B		T
AIMOPHILA BOTTERII ARIZONAE	ARIZONA BOTTERI'S SPARROW	G4T3?	S1		T
OPHILA BOTTERII TEXANA	TEXAS BOTTERI'S SPARROW	G4T4	S3B		T

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
AMMODRAMUS BAIRDII	BAIRD'S SPARROW	G3G4	S2		
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	G3G4	S2S3N,SXB		
ATHENE CUNICULARIA HYPUGAEA	WESTERN BURROWING OWL	G4TU	S2B		
BUTEO ALBICAUDATUS	WHITE-TAILED HAWK	G4G5	S4B		T
BUTEO ALBONOTATUS	ZONE-TAILED HAWK	G4	S3B		T
BUTEO NITIDUS	GRAY HAWK	G4G5	S2B		T
BUTEO REGALIS	FERRUGINOUS HAWK	G4	S2B,S4N		
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK	G4G5	S2B		T
CAMPEPHILUS PRINCIPALIS	IVORY-BILLED WOODPECKER	G1	SX	LE	E
CAMPTOSTOMA IMBERBE	NORTHERN BEARDLESS-TYRANNULET	G5	S3B		T
CHARADRIUS ALEXANDRINUS	SNOWY PLOVER	G4	S3B		
CHARADRIUS ALEXANDRINUS NIVOSUS	WESTERN SNOWY PLOVER	G4T3	S2B		
CHARADRIUS ALEXANDRINUS TENUIROSTRIS	SOUTHEASTERN SNOWY PLOVER	G4T3	S2B		
CHARADRIUS MELODUS	PIPING PLOVER	G3	S2	LT	T
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G2	S2	PT	
CHLIDONIAS NIGER	BLACK TERN	G4	S3		
CHONDROHIERAX UNCINATUS	HOOK-BILLED KITE	G4	S2		
CYANOCORAX MORIO	BROWN JAY	G5	S2B		
CYRTONYX MONTEZUMAE	MONTEZUMA QUAIL	G4G5	S3B		
DENDROICA CERULEA	CERULEAN WARBLER	G4	SHB,S3N		
DENDROICA CHRYSOPARIA	GOLDEN-CHEEKED WARBLER	G2	S2B	LE	E
EGRETTA RUFESCENS	REDDISH EGRET	G4	S3B		T
ELANOIDES FORFICATUS	SWALLOW-TAILED KITE	G5	S2B		T
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5T2	S1B	LE	E
FALCO FEMORALIS SEPTENTRIONALIS	NORTHERN APLOMADO FALCON	G4T2	S1	LE	E
FALCO MEXICANUS	PRAIRIE FALCON	G4G5	S3B		
FALCO PEREGRINUS	PEREGRINE FALCON	G4	S3	DL ~~E/SA~~	E,T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T3	S2B	DL ~~LE~~	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G4T4	S3N	DL E/SA	T
GEOTHLYPIS TRICHAS INSPERATA	BROWNSVILLE COMMON YELLOWTHROAT	G5T2	S1B		
GLAUCIDIUM BRASILIANUM CACTORUM	CACTUS FERRUGINOUS PYGMY-OWL	G5T3	S3B		T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G4	S3B,S3N	LT-PDL	T
ICTERUS CUCULLATUS CUCULLATUS	MEXICAN HOODED ORIOLE	G5TU	S4B		
ICTERUS CUCULLATUS SENNETTI	SENNETT'S HOODED ORIOLE	G5TU	S3B		
ICTERUS GRADUACAUDA AUDUBONII	AUDUBON'S ORIOLE	G5T4	S3B		
LANIUS LUDOVICIANUS MIGRANS	MIGRANT LOGGERHEAD SHRIKE	G4G5T3	S2B		
LATERALLUS JAMAICENSIS	BLACK RAIL	G4?	S2B		
MYCTERIA AMERICANA	WOOD STORK	G4	SHB,S2N		T
NUMENIUS BOREALIS	ESKIMO CURLEW	G1	SH	LE	E
PACHYRAMPHUS AGLAIAE	ROSE-THROATED BECARD	G4G5	SA		T
PARULA PITIAYUMI	TROPICAL PARULA	G5	S3B		T
PELECANUS OCCIDENTALIS	BROWN PELICAN	G4	S3B	LE	E
PICOIDES BOREALIS	RED-COCKADED WOODPECKER	G3	S2B	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S4B		T
SETOPHAGA RUTICILLA	AMERICAN REDSTART	G5	S2B		
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2Q	S1B	LE	E

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
STERNA FUSCATA	SOOTY TERN	G5	S2B		T
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3T3	S1B	LT	T
TYMPANUCHUS CUPIDO ATTWATERI	ATTWATER'S GREATER PRAIRIE-CHICKEN	G4T1	S1B	LE	E
TYMPANUCHUS PALLIDICINCTUS	LESSER PRAIRIE-CHICKEN	G3	S2B	C1	
VERMIVORA BACHMANII	BACHMAN'S WARBLER	GH	SR	LE	E
VIREO ATRICAPILLUS	BLACK-CAPPED VIREO	G2	S2B	LE	E
*** CRUSTACEANS					
ASELLUS SMITHII	TEXAS TROGLOBITIC WATER SLATER	G1	S1		
CAMBARELLUS TEXANUS	A CRAYFISH	G3?	S3?		
FALLICAMBARUS DEVASTATOR	TEXAS PRAIRIE CRAYFISH	G2?	S2?		
GAMMARUS HYALLELOIDES	DIMINUTIVE AMPHIPOD	G1	S1		
GAMMARUS PECOS	PECOS AMPHIPOD	G1	S1		
HYALELLA TEXANA	CLEAR CREEK AMPHIPOD	G1	S1		
MONODELLA TEXANA		G1	S1		
ORCONECTES MALETAE	A CRAYFISH	G2	S1?		
PALAEMONETES ANTRORUM	TEXAS CAVE SHRIMP	G1	S1		
PROCAMBARUS NECHESAE		G1G2	S1S2		
PROCAMBARUS TEXANUS	A CRAYFISH	G1	S?		
STYGOBROMUS BALCONIUS	BALCONES CAVE AMPHIPOD	G1	S1		
GOBROMUS BIFURCATUS	BIFURCATED CAVE AMPHIPOD	G1	S1		
STYGOBROMUS DEJECTUS	CASCADE CAVE AMPHIPOD	G1	S1		
STYGOBROMUS FLAGELLATUS	EZELL'S CAVE AMPHIPOD	G1	S1		
STYGOBROMUS HADENOECUS	DEVIL'S SINKHOLE AMPHIPOD	G1	S1		
STYGOBROMUS LONGIPES	LONG-LEGGED CAVE AMPHIPOD	G1	S1		
STYGOBROMUS PECKI	PECK'S CAVE AMPHIPOD	G1	S1	~~PE~~ LE	E
STYGOBROMUS REDDELLI	REDDELL'S CAVE AMPHIPOD	G1	S1		
STYGOBROMUS RUSSELLI	AN AMPHIPOD	G3	S3		
*** FISHES					
AWAOUS TAJASICA	RIVER GOBY	G5	S1		T
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER	G3	S1		T
CYCLEPTUS ELONGATUS	BLUE SUCKER	G3	S3		T
CYPRINELLA PROSERPINA	PROSERPINE SHINER	G3	S2		T
CYPRINODON BOVINUS	LEON SPRINGS PUPFISH	G1	S1	LE	E
CYPRINODON ELEGANS	COMANCHE SPRINGS PUPFISH	G1	S1	LE	E
CYPRINODON EXIMIUS	CONCHOS PUPFISH	G4	S1		T
CYPRINODON PECOSENSIS	PECOS PUPFISH	G1	S1	~~X~~	T
DIONDA ARGENTOSA	MANANTIAL ROUNDNOSE MINNOW	G2	S2		
DIONDA DIABOLI	DEVILS RIVER MINNOW	G1	S1	~~X~~ LT	T
DIONDA SERENA	NUECES ROUNDNOSE MINNOW	G2	S2		
ERIMYZON OBLONGUS	CREEK CHUBSUCKER	G5	S2S3		T
ETHEOSTOMA CLARUM	WESTERN SAND DARTER	G3	S3		
ETHEOSTOMA FONTICOLA	FOUNTAIN DARTER	G1	S1	LE	E
ETHEOSTOMA GRAHAMI	RIO GRANDE DARTER	G3	S2		T
BUSIA GAIGEI	BIG BEND GAMBUSIA	G1	S1	LE	E
BUSIA GEORGEI	SAN MARCOS GAMBUSIA	GX	SX	LE	E

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
GAMBUSIA HETEROCHIR	CLEAR CREEK GAMBUSIA	G1	S1	LE	E
GAMBUSIA NOBILIS	PECOS GAMBUSIA	G2	S2	LE	E
GAMBUSIA SENILIS	BLOTCHED GAMBUSIA	G4	SX		T
GILA PANDORA	RIO GRANDE CHUB	G3	S1		T
GOBIONELLUS ATRIPINNIS	BLACKFIN GOBY	G3	S1		T
HYBOGNATHUS AMARUS	RIO GRANDE SILVERY MINNOW	G1G2	SX	LE	E
HYBOGNATHUS PLACITUS	PLAINS MINNOW	G5	S4		
ICTALURUS LUPUS	HEADWATER CATFISH	G3	S2		
ICTALURUS SP 1	CHIHUAHUA CATFISH	G1G2	S1S2		
MACRHYBOPSIS AESTIVALIS TETRANEMUS	ARKANSAS RIVER SPECKLED CHUB	~~G5T5~~ G2	~~S5~~ S1		
MICROPHIS BRACHYURUS	OPOSSUM PIPEFISH	G5	S1		T
MICROPTERUS TRECULI	GUADALUPE BASS	G3	S3		
MOXOSTOMA AUSTRINUM	WEST MEXICAN REDHORSE	G3	S1		
NOTROPIS BUCCULA	SMALLEYE SHINER	G2Q	S2		
NOTROPIS CHIHUAHUA	CHIHUAHUA SHINER	G3	S2		T
NOTROPIS GIRARDI	ARKANSAS RIVER SHINER	G2	S2	~~PE~~ LT	T
NOTROPIS HUBBSI	BLUEHEAD SHINER	G3	S1		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER	G3	S3		
NOTROPIS OXYRHYNCHUS	SHARPNOSE SHINER	G3	S3		
NOTROPIS SIMUS	BLUNTNOSE SHINER	G2	SX		T
PERCINA MACULATA	BLACKSIDE DARTER	G5	S1		T
POLYODON SPATHULA	PADDLEFISH	G4	S3		T
SATAN EURYSTOMUS	WIDEMOUTH BLINDCAT	G1	S1		T
SCAPHIRHYNCHUS PLATORYNCHUS	SHOVELNOSE STURGEON	G4	S2		T
SYNGNATHUS AFFINIS	TEXAS PIPEFISH	G1	S1		
TROGLOGLANIS PATTERSONI	TOOTHLESS BLINDCAT	G1	S1		T
*** INSECTS					
AESHNA DUGESI	ARROYO DARNER	G3	S?		
AGATHYMUS CHISOSENSIS		G2?	S2?		
AGATHYMUS GILBERTI		G2?	S?		
AGATHYMUS VALVERDIENSIS		G2?	S?		
AMBLYCHILA PICOLOMINII	A TIGER BEETLE	G3	S?		
AMBRYSUS HUNGERFORDI HUNGERFORDI	HUNGERFORD'S NAUCORID	G5T3	S1		
AMPLYPTERUS BLANCHARDI	BLANCHARDS' SPHINX MOTH	G1	S1		
ANOMALA TIBIALIS	TIBIAL SCARAB	GH	SH		
APODEMIA CHISOSENSIS	CHISOS METALMARK	G1G3	S?		
ARGIA LEONORAE	BALMORHEA DAMSELFLY	G2G3	S2		
ASAPHOMYIA TEXANUS	TEXAS ASAPHOMYIAN TABANID FLY	GH	SH		
ATRYTONOPSIS CESTUS		G1G3	S?		
AUSTROTINODES TEXENSIS	TEXAS AUSTROTINODES CADDISFLY	G2	S2		
BATRISODES TEXANUS	COFFIN CAVE MOLD BEETLE	G1	S1	LE	
BATRISODES VENYIVI	HELOTES MOLD BEETLE	G1	S1	LE	
CALEPHELIS FREEMANI	FREEMAN'S METALMARK	GH	SH		
CALEPHELIS RAWSONI	RAWSON'S METALMARK	G3?	S?		
CHEUMATOPSYCHE FLINTI	FLINT'S NET-SPINNING CADDISFLY	G3	S3		
CHEUMATOPSYCHE MORSEI	MORSE'S NET-SPINNING CADDISFLY	G1	S1		

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
CHIMARRA HOLZENTHALI	HOLZENTHAL'S PHILOPOTAMID CADDISFLY	G1	S1		
CICINDELA CAZIERI	CAZIER'S TIGER BEETLE	G1	S1		
CICINDELA CHLOROCEPHALA SMYTHI	SMYTH'S TIGER BEETLE	GHTH	SH		
CICINDELA HORNII	A TIGER BEETLE	G3	S?		
CICINDELA NEVADICA OLMOSA	LOS OLMOS TIGER BEETLE	G5T3	S1S2		
CICINDELA NIGROCOERULEA SUBTROPICA	SUBTROPICAL BLUE-BLACK TIGER BEETLE	G5T2	SH		
CICINDELA OBSOLETA NEOJUVENILIS	NEOJUVENILE TIGER BEETLE	G5T1	SH		
CICINDELA POLITULA BARBARANNAE	BARBARA ANN'S TIGER BEETLE	G5T1	S1		
CICINDELA POLITULA PETROPHILA	GUADALUPE MOUNTAINS TIGER BEETLE	G5T2	S1		
CYLINDROPSIS SP 1	TOOTH CAVE BLIND ROVE BEETLE	G1	S1		
DERONECTES NEOMEXICANA	BONITA DIVING BEETLE	G1	S1		
EUPROSERPINUS WIESTI	WIEST'S SPHINX MOTH	G3G4	S1		
EXIMACRIS SUPERBUM	SUPERB GRASSHOPPER	GH	SH		
FIXSENIA POLINGI	POLING'S HAIRSTREAK	G1	S1		
GOMPHUS MODESTUS	GULF COAST CLUBTAIL	G3	S?		
HAIDEOPORUS TEXANUS	EDWARDS AQUIFER DIVING BEETLE	G1	S1		
HALIPLUS NITENS	DISJUNCT CRAWLING WATER BEETLE	GH	SH		
HETERELMIS COMALENSIS	COMAL SPRINGS RIFFLE BEETLE	G1	S1	~~PE~~ LE	
HYDROPTILA OUACHITA	A PURSE CASEMAKER CADDISFLY	G1	S1		
LIBELLULA COMPOSITA	BLEACHED SKIMMER	G3	S?		
NEBIUS TEXANUS	TEXAS MINUTE MOSS BEETLE	GH	SH		
LORDITHON NIGER	BLACK LORDITHON ROVE BEETLE	G1	SH		
MEGACEPHALA AFFINIS ANGUSTATA	A TIGER BEETLE	G5T3	S?		
MINISTRYMON CLYTIE	CLYTIE HAIRSTREAK	G3?	S?		
NEUROCORDULIA MOLESTA	SMOKY SHADOWFLY	G3	S?		
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	G1	SR	LE	
PHYLOCENTROPUS HARRISI		G1	S1		
PIRUNA HAFERNIKI		G1?	S1?		
PROTOPTILA ARCA	SAN MARCOS SADDLE-CASE CADDISFLY	G1	S1		
PROTOPTILA BALMORHEA	BALMORHEA SADDLE-CASE CADDISFLY	G2	S1		
RHADINE EXILIS	A GROUND BEETLE	G1	S1	LE	
RHADINE INFERNALIS	A GROUND BEETLE	G1	S1	LE	
RHADINE PERSEPHONE	TOOTH CAVE GROUND BEETLE	G1	S1	LE	
SCHINIA INDIANA	PHLOX MOTH	GU	SH		
SOMATOCHLORA MARGARITA	BIG THICKET EMERALD DRAGONFLY	G2	S2		
STALLINGSIA MACULOSUS	MACULATED MANFREDA SKIPPER	G2	~~S2~~ SX		
STYGOPARNUS COMALENSIS	COMAL SPRINGS DRYOPID BEETLE	G1	S1	~~PE~~ LE	
TAENIOPTERYX STARKI	LEON RIVER WINTER STONEFLY	G1	S1		
TEXAMAUROPS REDDELLI	KRETSCHMARR CAVE MOLD BEETLE	G1	S1	LE	
ZIZULA CYNA	CYNA BLUE	G3	S?		
*** MAMMALS					
BALAENOPTERA MUSCULUS	BLUE WHALE	G2	S1	LE	E
BALAENOPTERA PHYSALUS	FINBACK WHALE	G3	S1	LE	E
BLARINA HYLOPHAGA HYLOPHAGA	ELLIOT'S SHORT-TAILED SHREW	G5T1Q	S1		
RINA HYLOPHAGA PLUMBEA	ARANSAS SHORT-TAILED SHREW	G5T1Q	S1		
IS LUPUS	GRAY WOLF	G4	SX	LE	E

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
CANIS RUFUS	RED WOLF	G1	SX	LE	E
CHOERONYCTERIS MEXICANA	MEXICAN LONG-TONGUED BAT	G3G4	S1		
CORYNORHINUS RAFINESQUII	RAFINESQUE'S BIG-EARED BAT	G3G4	S3		T
CORYNORHINUS TOWNSENDII PALLESCENS	PALE TOWNSEND'S BIG EARED BAT	G4T4	S3?		
CYNOMYS LUDOVICIANUS ~~ARIZONENSIS~~	~~ARIZONA~~ BLACK-TAILED PRAIRIE DOG	G5T3	S3	C	
DIPODOMYS ELATOR	TEXAS KANGAROO RAT	G2	S2		T
EUBALAENA GLACIALIS	BLACK RIGHT WHALE	G1	S1	LE	E
EUDERMA MACULATUM	SPOTTED BAT	G4	S2		T
EUMOPS PEROTIS CALIFORNICUS	GREATER WESTERN MASTIFF BAT	G5T?	S3		
FELIS PARDALIS	OCELOT	G3	S1	LE	E
FELIS WIEDII	MARGAY	G3	SX		T
FELIS YAGUAROUNDI	JAGUARUNDI	G4	S1	LE	E
FERESA ATTENUATA	PYGMY KILLER WHALE	G4	S1		T
GEOMYS ARENARIUS	DESERT POCKET GOPHER	G3	S2		
GEOMYS KNOXJONESI	JONES' POCKET GOPHER	G3	S2		
GEOMYS PERSONATUS DAVISI	DAVIS POCKET GOPHER	G4T2	S2		
GEOMYS PERSONATUS FUSCUS	TEXAS POCKET GOPHER	G4T2	S2		
GEOMYS PERSONATUS MARITIMUS	MARITIME POCKET GOPHER	G4T2	S2		
GEOMYS PERSONATUS STRECKERI	CARRIZO SPRINGS POCKET GOPHER	G4T1	S1		
GEOMYS TEXENSIS BAKERI	FRIO POCKET GOPHER	G3T2	S2		
GEOMYS TEXENSIS TEXENSIS	LLANO POCKET GOPHER	G3T2	S2		
GLOBICEPHALA MACRORHYNCHUS	SHORT-FINNED PILOT WHALE	G5	S1		T
KOGIA BREVICEPS	PYGMY SPERM WHALE	G5	S1		T
KOGIA SIMUS	DWARF SPERM WHALE	G4	S1		T
LASIURUS EGA	SOUTHERN YELLOW BAT	G5	S1		T
LEPTONYCTERIS NIVALIS	GREATER LONG-NOSED BAT	G3	S1	LE	E
MESOPLODON DENSIROSTRIS	TROPICAL BEAKED WHALE	G4	S1		
MESOPLODON EUROPAEUS	GERVAIS' BEAKED WHALE	G3	S1		T
MICROTUS OCHROGASTER TAYLORI	PRAIRIE VOLE	G5T?	S1		
MUSTELA NIGRIPES	BLACK-FOOTED FERRET	G1	SH	LE	E
MYOTIS AUSTRORIPARIUS	SOUTHEASTERN MYOTIS BAT	G4	S3		
MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED BAT	G5	S3		
MYOTIS THYSANODES	FRINGED BAT	G5	S3		
MYOTIS VELIFER	CAVE BAT	G5	S4		
MYOTIS VOLANS	LONG-LEGGED BAT	G5	S4		
MYOTIS YUMANENSIS	YUMA MYOTIS BAT	G5	S4		
NASUA NARICA	WHITE-NOSED COATI	G5	S2?		T
ONDATRA ZIBETHICUS RIPENSIS	PECOS RIVER MUSKRAT	G5T?	S2S3		
ORCINUS ORCA	KILLER WHALE	G4G5	S1		T
ORYZOMYS COUESI	COUES' RICE RAT	G5	S2		T
OVIS CANADENSIS MEXICANA	DESERT BIGHORN SHEEP	G5T3	S2		
PANTHERA ONCA	JAGUAR	G3	SH	LE	XE
PEROMYSCUS TRUEI COMANCHE	PALO DURO MOUSE	G5T2	S2		T
PHYSETER MACROCEPHALUS	SPERM WHALE	G2	S1	LE	E
PSEUDORCA CRASSIDENS	FALSE KILLER WHALE	G5	S1		T
SCALOPUS AQUATICUS TEXANUS	PRESIDIO MOLE	G5T1Q	S1		
SIGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT	G5	S3		

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
SPILOGALE PUTORIUS INTERRUPTA	PLAINS SPOTTED SKUNK	G5T3T4	S3		
STENELLA CLYMENE	SHORT-SNOUTED SPINNER DOLPHIN	G4	S1		
STENELLA FRONTALIS	ATLANTIC SPOTTED DOLPHIN	G5	S1		T
STENELLA LONGIROSTRIS	LONG-SNOUTED SPINNER DOLPHIN	G5	S1		
STENO BREDANENSIS	ROUGH-TOOTHED DOLPHIN	G4	S1		T
SYLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL	G5T3	S3		
TAMIAS CANIPES	GRAY-FOOTED CHIPMUNK	G3	S2S3		
THOMOMYS BOTTAE GUADALUPENSIS	GUADALUPE SOUTHERN POCKET GOPHER	G5T2	S2		
THOMOMYS BOTTAE LIMPIAE	LIMPIA SOUTHERN POCKET GOPHER	G5T2	S2		
THOMOMYS BOTTAE TEXENSIS	LIMPIA CREEK POCKET GOPHER	G5T2	S2		
TRICHECHUS MANATUS	WEST INDIAN MANATEE	G2?	S1	LE	E
URSUS AMERICANUS	BLACK BEAR	G5	S3	T/SA	T
URSUS AMERICANUS LUTEOLUS	LOUISIANA BLACK BEAR	G5T3?	SR	LT	T
URSUS ARCTOS	GRIZZLY BEAR	G4	SX	LT	
VULPES VELOX	SWIFT FOX	G3	S3?		
ZIPHIUS CAVIROSTRIS	GOOSE-BEAKED WHALE	G4	S1		T
*** MOLLUSKS					
ARCIDENS CONFRAGOSUS	ROCK-POCKETBOOK	G3	S?		
ARKANSIA WHEELERI	OUACHITA ROCK-POCKETBOOK MUSSEL	G1	S1	LE	E
MUNELLA PASONIS	FRANKLIN MOUNTAIN WOOD SNAIL	G1	S1		
ASSIMINEA PECOS	PECOS ASSIMINEA SNAIL	G2	S1	C1	
COCHLIOPA TEXANA	PHANTOM CAVE SNAIL	G1	S1		
DISCONAIAS SALINASENSIS	SALINA MUCKET	G1Q	S1		
EUCHEMOTREMA CHEATUMI	PALMETTO PILL SNAIL	G1	S1		
FONTELICELLA DAVISI	DAVIS SPRING SNAIL	G1	S1		
FONTELICELLA METCALFI	PRESIDIO COUNTY SPRING SNAIL	G1	S1		
FUSCONAIA ASKEWI	TEXAS PIGTOE	G3	S1S2		
FUSCONAIA LANANENSIS	TRIANGLE PIGTOE	G2	S1		
HUMBOLDTIANA CHEATUMI	DAVIS MOUNTAINS THREEBAND	G2	S2		
HUMBOLDTIANA CHISOSENSIS	CHISOS MOUNTAINS THREEBAND	G1	S1		
HUMBOLDTIANA FERRISSIANA	MITRE PEAK THREEBAND	G2	S2		
HUMBOLDTIANA HOEGIANA PRAESIDII	SAN CARLOS THREEBAND	G3T3	S3		
HUMBOLDTIANA PALMERI	MOUNT LIVERMORE THREEBAND	G2	S2		
HUMBOLDTIANA TEXANA	STOCKTON PLATEAU THREEBAND	G2	S2		
HUMBOLDTIANA ULTIMA	NORTHERN THREEBAND	G2	S2		
LAMPSILIS BRACTEATA	TEXAS FATMUCKET	G2	S?		
LAMPSILIS SATURA	SANDBANK POCKETBOOK	G3	S1		
OBOVARIA JACKSONIANA	SOUTHERN HICKORYNUT	G1G2	S?		
PHREATODROBIA IMITATA	MIMIC CAVESNAIL	G1	S1		
PLEUROBEMA RIDDELLI	LOUISIANA PIGTOE	G1	S1		
POLYGYRA HIPPOCREPIS	HORSESHOE LIPTOOTH	G1	S1		
POPENAIAS POPEI	TEXAS HORNSHELL	G2	S2	C	
POTAMILUS AMPHICHAENUS	TEXAS HEELSPLITTER	G1	S1		
QUADRULA AUREA	GOLDEN ORB	G2G3	S?		
DRULA COUCHIANA	RIO GRANDE MONKEYFACE	GH	SH		
ADRULA HOUSTONENSIS	SMOOTH PIMPLEBACK	G2	S?		

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS BIOLOGICAL AND CONSERVATION DATA SYSTEM
SPECIAL ANIMAL LIST
06 OCT 1997

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
QUADRULA PETRINA	TEXAS PIMPLEBACK	G2G3	S?		
QUADRULA PUSTULOSA MORTONI	WESTERN PIMPLEBACK	G5T2T3	S?		
QUINCUNCINA MITCHELLI	FALSE SPIKE MUSSEL	G1	SH		
SONORELLA METCALFI	FRANKLIN MOUNTAIN TALUS SNAIL	G1	S1		
TRUNCILLA COGNATA	MEXICAN FAWNSFOOT MUSSEL	G1	S1		
TRUNCILLA MACRODON	TEXAS FAWNSFOOT	G1G2	S?		
TRYONIA ADAMANTINA	DIAMOND Y SPRING SNAIL	G1	S1	C1	
TRYONIA BRUNEI	BRUNE'S TRYONIA	G1	S1		
TRYONIA CHEATUMI	PHANTOM CAVE SPRING TRYONIA	G1	S1		
TRYONIA STOCKTONENSIS	GONZALES SPRING SNAIL	G1	S1	C1	
*** REPTILES					
CARETTA CARETTA	LOGGERHEAD SEA TURTLE	G3	S2	LT	T
CEMOPHORA COCCINEA COPEI	NORTHERN SCARLET SNAKE	G5T5	S3		T
CEMOPHORA COCCINEA LINERI	TEXAS SCARLET SNAKE	G5T2	S2		T
CHELONIA MYDAS	GREEN SEA TURTLE	G3	S1	LT	T
COLEONYX RETICULATUS	RETICULATED GECKO	G3	S3		T
CONIOPHANES IMPERIALIS	BLACK-STRIPED SNAKE	G3	S2		T
CROTALUS HORRIDUS	TIMBER (CANEBRAKE) RATTLESNAKE	G5	S4		T
CROTAPHYTUS RETICULATUS	RETICULATE COLLARED LIZARD	G3	S2		T
DERMOCHELYS CORIACEA	LEATHERBACK SEA TURTLE	G3	S1	LE	E
DRYMARCHON CORAIS	INDIGO SNAKE	G5	S3		T
DRYMOBIUS MARGARITIFERUS	SPECKLED RACER	G5	S1		T
ERETMOCHELYS IMBRICATA	ATLANTIC HAWKSBILL SEA TURTLE	G3	S1	LE	E
GOPHERUS BERLANDIERI	TEXAS TORTOISE	G4	S3		T
GRAPTEMYS CAGLEI	CAGLE'S MAP TURTLE	G3	S3	C1	T
GRAPTEMYS OUACHITENSIS SABINENSIS	SABINE MAP TURTLE	G5T3	S3		
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD	G3G4	S3?		
HOLBROOKIA PROPINQUA	KEELED EARLESS LIZARD	G3?	S3?		
KINOSTERNON HIRTIPES MURRAYI	CHIHUAHUAN MUD TURTLE	G3T3	S1		T
LEPIDOCHELYS KEMPII	KEMP'S RIDLEY SEA TURTLE	G1	S1	LE	E
LEPTODEIRA SEPTENTRIONALIS SEPTENTRIONALIS	NORTHERN CAT-EYED SNAKE	G5T5	S2		T
LIOCHLOROPHIS VERNALIS	SMOOTH GREEN SNAKE	G5	S1		T
MACROCLEMYS TEMMINCKII	ALLIGATOR SNAPPING TURTLE	G3G4	S3		T
MALACLEMYS TERRAPIN LITTORALIS	TEXAS DIAMONDBACK TERRAPIN	G5T3	S3		
NERODIA CLARKII	GULF SALTMARSH SNAKE	G4Q	S4		
NERODIA HARTERI	BRAZOS WATER SNAKE	G2	S2		T
NERODIA PAUCIMACULATA	CONCHO WATER SNAKE	G2	S2	LT	~~T~~
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4		T
PHRYNOSOMA HERNANDESI	MOUNTAIN SHORT-HORNED LIZARD	G5	S3		T
PITUOPHIS MELANOLEUCUS RUTHVENI	LOUISIANA PINE SNAKE	G5T3	S2	C	T
SCELOPORUS ARENICOLUS	DUNES SAGEBRUSH LIZARD	G5T2	S2	C	
TANTILLA ATRICEPS	MEXICAN BLACKHEAD SNAKE	G3	S1		
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE	G4	S2		T
THAMNOPHIS SIRTALIS ANNECTENS	TEXAS GARTER SNAKE	G5T3	S3		
THAMNOPHIS SIRTALIS DORSALIS	NEW MEXICO GARTER SNAKE	G5T3	S1		
TRACHEMYS GAIGEAE	BIG BEND SLIDER	G3	S2		

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
TRIMORPHODON BISCUTATUS	TEXAS LYRE SNAKE	G5	S3		T

360 Records Processed

BASIC CODE KEY

FEDERAL STATUS (USESA)

LE - Listed Endangered
LT - Listed Threatened
LELT - Listed Endangered in part of range, Threatened in a different part
PE - Proposed to be listed Endangered
PT - Proposed to be listed Threatened
PDL - Proposed to be Delisted
E(S/A) or T(S/A) - Listed Endangered or Threatened on basis of Similarity of Appearance.
DL - Delisted Endangered/Threatened
C1 - Candidate, Category 1. USFWS has substantial information on biological vulnerability and threats to support proposing to list as endangered or threatened. Data are being gathered on habitat needs and/or critical habitat designations.
C1* - C1, but lacking known occurrences
C1** - C1, but lacking known occurrences, except in captivity/cultivation
XE - Essential Experimental Population.
XN - Non-essential Experimental Population.

STATE STATUS

E - Listed as Endangered in the State of Texas
T - Listed as Threatened in the State of Texas
blank - Not currently listed

GLOBAL RANK (GRANK)

G1 - Critically imperiled globally, extremely rare, 5 or fewer occurrences. [Critically endangered throughout range.]
G2 - Imperiled globally, very rare, 6 to 20 occurrences. [Endangered throughout range.]
G3 - Very rare and local throughout range or found locally in restricted range, 21 to 100 occurrences. [Threatened throughout range.]
G4 - Apparently secure globally.
G5 - Demonstrably secure globally.
GH - Of historical occurrence through its range.
G#T# - "G"= species rank; "T"= rank of variety or subspecies taxa.
GU - Possibly in peril range-wide, but status uncertain.
G#G# - Ranked within a range as status uncertain.
GX - Believed to be extinct throughout range.
Q - Qualifier denoting questionable taxonomic assignment.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

STATE RANK (SRANK)

S1 - Critically imperiled in state, extremely rare, very vulnerable to extirpation, 5 or fewer occurrences.
S2 - Imperiled in state, very rare, vulnerable to extirpation, 6 to 20 occurrences.
S3 - Rare or uncommon in state, 21 to 100 occurrences.
S4 - Apparently secure in state.
S5 - Demonstrably secure in state.
SA - Accidental in state.
SE - An exotic species established in state.
SH - Of historical occurrence in state. May be rediscovered.
SP - Potential occurrence in state.
SR - Reported, but without persuasive documentation.
SRF - Reported in error, but error persists in literature.
SU - Possibly in peril in state, but status uncertain.
SX - Apparently extirpated from State.
SZ - Migratory/transient in state to irregular/dispersed locations.
B - Basic rank refers to the breeding population in the state.
N - Basic rank refers to the non-breeding population in the state.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

A List of the Rare Plants of Texas
January 2000 Edition

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This list is provided in an attempt to provide basic distributional information about a few hundred of the most globally-rare plant taxa that occur naturally in Texas. It is hoped that the limited information provided herein will be of interest to public and private land managers, field biologists, environmental consultants, teachers of all types and anyone with an interest in the natural history of Texas.

Most of the document is self-explanatory, but in the interest of brevity a number of terms and symbols are used. These are defined on the pages following the plant list.

The reader should be aware that this is NOT a list of endangered species. Although it includes all of the Texas plant species that are listed as endangered or threatened by the U. S. Fish and Wildlife Service, the vast majority of plant species that appear on this list have no legal status whatsoever. By scanning the "Federal Status" column, the reader can quickly see which species are legally protected and which are not. For information about rules and regulations regarding such federally-listed plant species and for information about whether such rules apply in private property situations, contact the local office of the U. S. Fish and Wildlife Service. Information about state-listed plant species is available from the Texas Parks and Wildlife Department.

Currently under development is a "watch list" of plant species that, although not quite rare enough to appear on this "Rare Plants of Texas" list, may nonetheless be of conservation interest to various parties. Copies of the current draft are available upon request.

This list is produced jointly by Wildlife Diversity Program of the Texas Parks and Wildlife Department and the Texas Conservation Data Center of The Nature Conservancy of Texas. It is reviewed periodically and necessary revisions are incorporated. Should you have any comments or questions regarding this list, please contact the Wildlife Diversity Program, Texas Parks and Wildlife Department, 3000 IH 35-S, Suite 100, Austin, TX 78704, (512) 912-7011; or The Nature Conservancy of Texas, P. O. Box 1440, San Antonio, Texas, 78205-1721, (210) 224-8774.

A List of the Rare Plants of Texas

Wildlife Diversity Program of Texas Parks and Wildlife Department
and Texas Conservation Data Center of The Nature Conservancy of Texas
January 2000 Edition

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Abronia macrocarpa large-fruited sand-verbena	G2	S2	LE	E	NYCTAGINACEAE Four-o'clock Family	Freestone, Leon and Robertson counties
Acleisanthes crassifolia Texas trumpets	G2	S2	FC2		NYCTAGINACEAE Four-o'clock Family	Kinney, Maverick and Val Verde counties; Coahuila
Acleisanthes wrightii Wright's trumpets	G2	S2			NYCTAGINACEAE Four-o'clock Family	Brewster, Pecos, Reeves (H), Terrell and Val Verde counties
Adelia vaseyi Vasey's adelia	G2G3	S2S3			EUPHORBIACEAE Spurge Family	Cameron, Hidalgo and Starr counties; Tamaulipas
Agalinis auriculata (see Tomanthera auriculata)						
Agalinis calycina Leoncita false foxglove	GH	SH			SCROPHULARIACEAE Snapdragon Family	Brewster County (H); Coahuila (H)
Agalinis navasotensis Navasota false foxglove	G1	S1			SCROPHULARIACEAE Snapdragon Family	Grimes County
Agave chisosensis (see Agave glomeruliflora)						
Agave glomeruliflora Chisos agave	G2Q	S2	FC2		AGAVACEAE Agave Family	Brewster, Culberson and Hudspeth counties; Coahuila

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Agrimonia incisa incised groovebur	G3	S1S2	FC2		ROSACEAE Rose Family	Anderson, Angelina, Jasper, Newton and Sabine counties; AL, FL, GA, MS, NC (?) and SC
Allium elmendorfii Elmendorf's onion	G2	S2			LILIACEAE Lily Family	Atascosa, Bee, Bexar, Kenedy, Llano, Nueces, Refugio, San Patricio and Wilson counties
Allolepis texana Texas false saltgrass	G2	S1			POACEAE Grass Family	Brewster, El Paso, Jeff Davis and Presidio counties; CA; Chihuahua, Coahuila, Durango and Tamaulipas (?)
Ambrosia cheiranthifolia South Texas ambrosia	G2	S2	LE	E	ASTERACEAE Sunflower Family	Cameron (H), Jim Wells, Kleberg and Nueces counties; Tamaulipas
Amsonia tharpii Tharp's blue-star	G1	S1	FC2		APOCYNACEAE Dogbane Family	Pecos County; NM
Ancistrocactus tobuschii Tobusch fishhook cactus	G3	S3	LE	E	CACTACEAE Cactus Family	Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde and Val Verde counties
Andrachne arida Trans-Pecos maidenbush	G2	S1	FC2		EUPHORBIACEAE Spurge Family	Brewster and Presidio counties; Chihuahua and Coahuila
Anemone edwardsiana var. petraea Edge Falls anemone	G4T1Q	S1	FC2		RANUNCULACEAE Buttercup Family	Bandera and Kendall counties
Anthericum chandleri (see Echeandia chandleri)						
Anulocaulis reflexus Ojinaga ringstem	G2	SH			NYCTAGINACEAE Four-o'clock Family	Jeff Davis (H) and Presidio counties (H); Chihuahua

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Aquilegia chrysantha var. chaplinei Guadalupe Mountains columbine	G4T2	S2	3C		RANUNCULACEAE Buttercup Family	Culberson and Presidio (?) counties; NM
Aquilegia chrysantha var. hinckleyana Hinckley's columbine	G4T1	S1	FC2		RANUNCULACEAE Buttercup Family	Presidio County
Arenaria livermorensis Livermore sandwort	G1	S1	FC2		CARYOPHYLLACEAE Pink Family	Jeff Davis County
Argythamnia aphoroides Hill Country wild-mercury	G2	S2	FC2		EUPHORBIACEAE Spurge Family	Bexar, Blanco, Brown, Comal, Gillespie, Hays (H), Kendall (H), Kerr, Kimble, Menard, Mills (H), Tom Green and Uvalde counties
Argythamnia argyraea silvery wild-mercury	G2	S2	3C		EUPHORBIACEAE Spurge Family	Kinney, La Salle and Maverick (H) counties
Asclepias prostrata prostrate milkweed	G1G2	S1S2	FC2		ASCLEPIADACEAE Milkweed Family	Starr and Zapata counties; Tamaulipas
Aster laevis var. guadalupensis Guadalupe Mountains aster	G5T1Q	S1	FC2		ASTERACEAE Sunflower Family	Culberson County
Aster puniceus ssp. elliottii var. scabricaulis rough-stem aster	G5T2	S2	FC2		ASTERACEAE Sunflower Family	Anderson, Cherokee, Franklin, Henderson, Hopkins, Smith, Van Zandt and Wood counties; LA, MS
Astragalus gypsodes gyp locoweed	G2	S2	3C		FABACEAE Legume Family	Culberson, Hudspeth and Reeves counties; NM
Astragalus mollissimus var. marcidus withered woolly loco	G5T2	S2	FC2		FABACEAE Legume Family	Dallam, Jeff Davis (H) and Presidio counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Astrophytum asterias star cactus	G1	S1	LE	E	CACTACEAE Cactus Family	Cameron, Hidalgo (H) and Starr counties; Nuevo León and Tamaulipas
Atriplex klebergorum Kleberg saltbush	G2	S2	3C		CHENOPODIACEAE Goosefoot Family	Kleberg, La Salle, Starr and Webb counties
Ayenia limitaris Texas ayenia	G2	S1	LE	E	STERCULIACEAE Cacao Family	Cameron and Hidalgo counties; Coahuila and Tamaulipas
Bartonia texana Texas screwstem	G2	S2	3C		GENTIANACEAE Gentian Family	Angelina, Hardin, Jasper, Nacogdoches, Newton, Polk, San Augustine, San Jacinto and Tyler counties
Batesimalva violacea purple gay-mallow	G2	S1	FC2		MALVACEAE Mallow Family	Brewster County; Coahuila and Nuevo León
Boerhavia mathisiana Mathis spiderling	G2	S1	FC2		NYCTAGINACEAE Four-o'clock Family	Live Oak and San Patricio counties; San Luis Potosí and Tamaulipas
Bonamia ovalifolia bigpod bonamia	G1	S1	FC2		CONVOLVULACEAE Morning-glory Family	Brewster County; Coahuila
Bouteloua kayi Kay's grama	G1Q	S1			POACEAE Grass Family	Brewster County
Brickellia baccharidea resin-leaf brickellbush	G2	S1			ASTERACEAE Sunflower Family	El Paso County; AZ; Sonora
Brickellia brachyphylla var. hinckleyi Hinckley's brickellbush	G5T2Q	S2	FC2		ASTERACEAE Sunflower Family	Brewster (H) and Jeff Davis counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Brickellia brachyphylla var. terlinguensis Terlingua brickellbush	G5TH	SH	FC2		ASTERACEAE Sunflower Family	Brewster (H) and Hudspeth (H) counties
Brongniartia minutifolia little-leaf brongniartia	G2	S1	FC2		FABACEAE Legume Family	Brewster County; Chihuahua
Caesalpinia brachycarpa (see Pomaria brachycarpa)						
Caesalpinia phyllanthoides South Texas rushpea	G2	S1			FABACEAE Legume Family	Bexar (H), Jim Wells and Live Oak counties; Tamaulipas
Callirhoe scabriuscula Texas poppy-mallow	G2	S2	LE	E	MALVACEAE Mallow Family	Coke, Mitchell and Runnels counties
Campanula reverchonii Basin bellflower	G2	S2	3C		CAMPANULACEAE Bluebell Family	Burnet, Kendall, Llano and Travis (H) counties
Cardamine macrocarpa var. texana Texas largeseed bittercress	G3T2	S2			BRASSICACEAE Mustard Family	Brewster, Kinney and Uvalde counties; Coahuila and Nuevo León
Cardiospermum dissectum Chihuahua balloon-vine	G2	S2			SAPINDACEAE Soapberry Family	Hidalgo, Starr and Zapata counties; Chihuahua, Durango and Tamaulipas
Cassia orcuttii (see Senna orcuttii)						
Cassia ripleyana (see Senna ripleyana)						
Castilleja ciliata fringed paintbrush	G1Q	S1	FC2		SCROPHULARIACEAE Snapdragon Family	Jeff Davis County
Castilleja elongata tall paintbrush	G2Q	S2			SCROPHULARIACEAE Snapdragon Family	Brewster County

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Cereus greggii var. greggii (see Peniocereus greggii var. greggii)						
Chaetopappa hersheyi mat leastdaisy	G3	S2	FC2		ASTERACEAE Sunflower Family	Culberson and Hudspeth counties; NM
Chamaesyce astyla alkali spurge	G2	S1			EUPHORBIACEAE Spurge Family	Pecos County; Coahuila, Durango and Nuevo León
Chamaesyce chaetocalyx var. triligulata three-tongue spurge	G5T1	S1	FC2		EUPHORBIACEAE Spurge Family	Brewster and Randall (?) counties; Coahuila
Chamaesyce geyeri var. wheeleriana Wheeler's spurge	G5T2	S1			EUPHORBIACEAE Spurge Family	El Paso and Hudspeth counties; NM; Chihuahua
Chamaesyce golondrina swallow spurge	G2	S2	FC2		EUPHORBIACEAE Spurge Family	Brewster, Hudspeth and Presidio counties; Chihuahua and Coahuila
Chamaesyce jejuna dwarf broomspurge	G2	S2	3C		EUPHORBIACEAE Spurge Family	Brewster (H), Mitchell (H), Nolan, Pecos, Terrell and Val Verde counties
Chloris texensis Texas windmill-grass	G2	S2	FC2		POACEAE Grass Family	Brazoria, Brazos (H), Chambers, Galveston, Harris, Hidalgo (?), Nueces and Refugio counties
Chrysothamnus nauseosus ssp. texensis Guadalupe Mountains rabbitbrush	G5T2	S1	FC2		ASTERACEAE Sunflower Family	Culberson County; NM
Cleome multicaulis manystem spiderflower	G2G3	SH	FC2		CAPPARIDACEAE Caper Family	Presidio County (H); AZ, CO, NM and WY; Chihuahua, Durango, Jalisco, México D.F. and Michoacán

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Colubrina stricta Comal snakewood	G2	S1	FC2		RHAMNACEAE Buckthorn Family	Comal (?) and El Paso counties; Coahuila and Nuevo León
Coryphantha albicolumnaria (see Escobaria albicolumnaria)						
Coryphantha chaffeyi (see Escobaria dasyacantha var. chaffeyi)						
Coryphantha dasyacantha var. dasyacantha (see Escobaria dasyacantha var. dasyacantha)						
Coryphantha duncanii (see Escobaria dasyacantha var. duncanii)						
Coryphantha hesteri (see Escobaria hesteri)						
Coryphantha macromeris var. runyonii Runyon's cory cactus	G5T2	S2			CACTACEAE Cactus Family	Cameron (H), Hidalgo and Starr counties
Coryphantha minima (see Escobaria minima)						
Coryphantha ramillosa bunched cory cactus	G2	S2	LT	T	CACTACEAE Cactus Family	Brewster and Terrell counties; Coahuila
Coryphantha sneedii var. sneedii (see Escobaria sneedii var. sneedii)						
Coryphantha strobiliformis var. durispina (see Escobaria albicolumnaria)						
Coryphantha sulcata var. nickelsiae Nickel's cory cactus	G4T2	SH	FC2		CACTACEAE Cactus Family	Webb County (H); Coahuila, Nuevo León and Tamaulipas
Croton alabamensis var. texensis Texabama croton	G3T1	S1	FC2		EUPHORBIACEAE Spurge Family	Bell, Coryell and Travis counties
Croton pottsii var. thermophilus leatherweed croton	G5T2	S1			EUPHORBIACEAE Spurge Family	Brewster County; Coahuila

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Cryptantha crassipes Terlingua Creek cat's-eye	G1	S1	LE	E	BORAGINACEAE Borage Family	Brewster County
Cyperus cephalanthus giant sharpstem umbrella-sedge	G2Q	S1	FC2		CYPERACEAE Sedge Family	Harris County; LA
Cyperus onerosus dune umbrella-sedge	G2	S2	FC2		CYPERACEAE Sedge Family	Andrews, Ward and Winkler counties
Cypripedium kentuckiense southern lady's-slipper	G3	S1	FC2		ORCHIDACEAE Orchid Family	Cass, Harrison, Nacogdoches, Newton (X), Red River, Sabine, San Augustine and Shelby counties; AL, AR, KY, LA, MS, OK, TN and VA
Dalea bartonii Cox's dalea	G1	S1	FC2		FABACEAE Legume Family	Brewster County
Dalea reverchonii Comanche Peak prairie-clover	G2	S2	FC2		FABACEAE Legume Family	Hood (X), Montague, Parker and Wise counties
Dalea sabinalis Sabinal prairie-clover	GH	SH	FC2		FABACEAE Legume Family	Bandera (H), Uvalde (H) and Val Verde (H) counties
Desmodium lindheimeri Lindheimer's tickseed	G3	S1	FC2		FABACEAE Legume Family	Comal and Uvalde counties; Coahuila, Nuevo León, San Luis Potosí and Tamaulipas
Draba standleyi Standley's draba	G2G3	S1	FC2		BRASSICACEAE Mustard Family	Jeff Davis County; AZ and NM; Coahuila
Dyssodia tephroleuca (see Thymophylla tephroleuca)						

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Echeandia chandleri lila de los llanos	G3	S3	FC2		LILIACEAE Lily Family	Cameron, Kleberg and Nueces counties; Coahuila
Echinocactus asterias (see Astrophytum asterias)						
Echinocereus berlandieri var. angusticeps (see Echinocereus papillosus var. angusticeps)						
Echinocereus chisoensis var. chisoensis Chisos Mountains hedgehog cactus	G2T1	S1	LT	T	CACTACEAE Cactus Family	Brewster County
Echinocereus chloranthus var. neocapillus golden-spine hedgehog cactus	G4T1	S1	FC2		CACTACEAE Cactus Family	Brewster and Presidio counties
Echinocereus papillosus var. angusticeps small papillosus cactus	G3T1	S1	FC2		CACTACEAE Cactus Family	Hidalgo (H), Jim Hogg (?) and Starr counties
Echinocereus reichenbachii var. albertii black lace cactus	G5T1Q	S1	LE	E	CACTACEAE Cactus Family	Duval (I), Jim Wells, Kleberg and Refugio counties
Echinocereus reichenbachii var. chisoensis (see Echinocereus chisoensis var. chisoensis)						
Echinocereus viridiflorus var. correllii Correll's green pitaya	G5T2	S2	3C		CACTACEAE Cactus Family	Brewster, Coke and Pecos counties
Echinocereus viridiflorus var. davisii Davis' green pitaya	G5T1	S1	LE	E	CACTACEAE Cactus Family	Brewster County
Eleocharis brachycarpa short-fruited spikesedge	G1	SH	FC2		CYPERACEAE Sedge Family	south coastal Texas (H; county unknown); Tamaulipas
Eleocharis cylindrica cylinder spikesedge	G1	S1	FC2		CYPERACEAE Sedge Family	Lubbock (H) and Presidio counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Eriocaulon körnickianum small-headed pipewort	G2	S1	FC2		ERIOCAULACEAE Pipewort Family	Anderson, Brazos, Gillespie, Henderson, Leon (?) and Limestone counties; AR, GA and OK
Eriogonum greggii Gregg's wild-buckwheat	G2	S1			POLYGONACEAE Knotweed Family	Hidalgo (H) and Starr counties; Coahuila and Nuevo León
Eriogonum nealleyi Irion County wild-buckwheat	G2	S2	3C		POLYGONACEAE Knotweed Family	Coke, Howard, Irion, Pecos (H), Reagan, Runnels and Sterling counties
Eriogonum suffruticosum bushy wild-buckwheat	G2	S2	FC2		POLYGONACEAE Knotweed Family	Brewster, Pecos and Presidio counties
Escobaria albicolumnaria white column cactus	G2G3	S2S3	FC2		CACTACEAE Cactus Family	Brewster, Pecos and Presidio counties; Chihuahua
Escobaria chaffeyi (see Escobaria dasyacantha var. chaffeyi)						
Escobaria dasyacantha var. chaffeyi Chaffey's cory cactus	G3T2	S1	FC2		CACTACEAE Cactus Family	Brewster County; Zacatecas
Escobaria dasyacantha var. dasyacantha dense cory cactus	G3T3	S2	FC2		CACTACEAE Cactus Family	Brewster, El Paso (H), Hudspeth, Jeff Davis and Pecos counties; NM (?); Chihuahua
Escobaria dasyacantha var. duncanii Duncan's cory cactus	G3T3	S1	FC2		CACTACEAE Cactus Family	Brewster and Presidio (H) counties; NM
Escobaria guadalupensis Guadalupe Mountains pincushion cactus	G1	S1	FC2		CACTACEAE Cactus Family	Culberson County; NM

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Escobaria hesteri Hester's cory cactus	G2	S2	FC2		CACTACEAE Cactus Family	Brewster, Pecos and Terrell counties
Escobaria minima Nellie's cory cactus	G1	S1	LE	E	CACTACEAE Cactus Family	Brewster County
Escobaria sneedii var. sneedii Sneed's pincushion cactus	G2T2	S2	LE	E	CACTACEAE Cactus Family	El Paso County; NM
Euphorbia astyla (see Chamaesyce astyla)						
Euphorbia chaetocalyx var. triligulata (see Chamaesyce chaetocalyx var. triligulata)						
Euphorbia geyeri var. wheeleriana (see Chamaesyce geyeri var. wheeleriana)						
Euphorbia golondrina (see Chamaesyce golondrina)						
Eysenhardtia spinosa spiny kidney-wood	G2	S2			FABACEAE Legume Family	Presidio County; Chihuahua and Durango
Festuca ligulata Guadalupe Mountains fescue	G1	S1	C1		POACEAE Grass Family	Brewster and Culberson counties; Coahuila
Forsellesia texensis Texas grease bush	G1	S1	FC2		CROSSOSOMATACEAE Grease Bush Family	Uvalde and Val Verde (H) counties
Frankenia johnstonii Johnston's frankenia	G3	S3	LE	E	FRANKENIACEAE Frankenia Family	Starr, Webb and Zapata counties; Nuevo León
Fryxellia pygmaea small Fryxell-wort	G1	SH	FC2		MALVACEAE Mallow Family	west Texas (H; county unknown); Coahuila

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Gaillardia aestivalis var. winkleri white firewheel	G5T2	S2	FC2		ASTERACEAE Sunflower Family	Hardin County
Galium correllii cliff bedstraw	G2	S1	FC2		RUBIACEAE Madder Family	Brewster and Val Verde counties; Coahuila
Gaura boquillensis Boquillas lizardtail	G2	S2			ONAGRACEAE Evening Primrose Family	Brewster and Presidio counties; Chihuahua, Coahuila and Nuevo León
Genistidium dumosum brush-pea	G1	S1	FC2		FABACEAE Legume Family	Brewster County; Coahuila
Grindelia oolepis plains gumweed	G2	S2	3C		ASTERACEAE Sunflower Family	Bee, Cameron, Nueces, Refugio and San Patricio counties
Gutierrezia triflora (see Thurovia triflora)						
Hedeoma apiculatum McKittrick pennyroyal	G3	S2	DL	T	LAMIACEAE Mint Family	Culberson County; NM
Hedeoma pilosum Old Blue pennyroyal	GH	SH	FC2		LAMIACEAE Mint Family	Brewster County (H)
Hedyotis butterwickiae Mary's bluet	G1	S1	FC2		RUBIACEAE Madder Family	Brewster County
Hedyotis correllii Correll's bluet	G1	S1			RUBIACEAE Madder Family	Zapata County
Hedyotis pooleana Jackie's bluet	G1Q	S1			RUBIACEAE Madder Family	Brewster County

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Helianthus neglectus neglected sunflower	G2Q	S2			ASTERACEAE Sunflower Family	Ector, Loving, Ward and Winkler counties
Helianthus paradoxus Pecos sunflower	G2	S1	LT		ASTERACEAE Sunflower Family	Pecos and Reeves counties; NM
Helianthus praecox ssp. hirtus Dimmit sunflower	G4T2Q	S2	FC2		ASTERACEAE Sunflower Family	Dimmit and Zapata (M) counties
Heteranthera mexicana Mexican mud-plantain	G2	S2			PONTEDERIACEAE Pickerelweed Family	Cameron (H), Dimmit (H), Hidalgo (H), Hockley, Potter (H) and Swisher (H) counties; Coahuila, Nuevo León and Tamaulipas
Hexalectris revoluta Chisos coral-root	G1	S1	FC2		ORCHIDACEAE Orchid Family	Brewster and Culberson counties; Nuevo León and San Luis Potosí
Hexalectris warnockii Warnock's coral-root	G2	S2	FC2		ORCHIDACEAE Orchid Family	Brewster, Dallas, Gillespie (H), Hays, Jeff Davis (H), Presidio, Taylor and Terrell counties; AZ; Baja California and Coahuila
Hibiscus dasycalyx Neches River rose-mallow	G1	S1	C1		MALVACEAE Mallow Family	Cherokee, Harrison, Houston and Trinity counties
Hoffmannseggia tenella slender rush-pea	G1	S1	LE	E	FABACEAE Legume Family	Kleberg and Nueces counties
Houstonia butterwickiae (see Hedyotis butterwickiae)						
Hymenopappus biennis biennial woolywhite	G3	S2			ASTERACEAE Sunflower Family	Culberson County; NM

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Hymenopappus carrizoanus sandhill woolywhite	G2	S2			ASTERACEAE Sunflower Family	Anderson, Atascosa, Bexar (H), Caldwell (H), Frio, Guadalupe, Leon, Medina and Robertson counties
Hymenoxys texana Texas prairie dawn	G2	S2	LE	E	ASTERACEAE Sunflower Family	Fort Bend, Harris and La Salle (?) counties
Isoetes lithophila rock quillwort	G2	S2	FC2		ISOETACEAE Quillwort Family	Burnet, Llano and Mason counties
Justicia runyonii Runyon's water-willow	G2	S2	FC2		ACANTHACEAE Acanthus Family	Brazoria (?), Cameron, Goliad (?) and Hidalgo counties; Tamaulipas
Justicia wrightii Wright's water-willow	G2	S2	FC2		ACANTHACEAE Acanthus Family	Brewster (H), Pecos and Val Verde counties
Kallstroemia perennans perennial caltrop	G1	S1	FC2		ZYGOPHYLLACEAE Caltrop Family	Brewster, Presidio and Val Verde counties
Lachnocaulon digynum tiny bog buttons	G3	S1	FC2		ERIOCAULACEAE Pipewort Family	Jasper and Newton counties; AL, FL, LA and MS
Leavenworthia aurea var. texana Texas golden glade cress	G2T1	S1	C1		BRASSICACEAE Mustard Family	Nacogdoches (I), Sabine and San Augustine counties
Lechea mensalis Chisos pinweed	G1Q	S1	FC2		CISTACEAE Rockrose Family	Brewster County; Coahuila
Leitneria floridana corkwood	G3	S1	FC2		LEITNERIACEAE Corkwood Family	Brazoria, Chambers (H), Fort Bend, Galveston (I), Harris (I) and Jefferson counties; AL, AR, FL, GA, LA and MO

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Lepidospartum burgessii gypsum scalebroom	G2	S1	FC2		ASTERACEAE Sunflower Family	Hudspeth County; NM
Lesquerella pallida white bladderpod	G1	S1	LE	E	BRASSICACEAE Mustard Family	San Augustine County
Lesquerella thamnophila Zapata bladderpod	G1	S1	LE		BRASSICACEAE Mustard Family	Starr and Zapata counties
Lesquerella valida strong bladderpod	G2G3	S1	3C		BRASSICACEAE Mustard Family	Culberson and Hudspeth counties; NM; Coahuila?
Liatris bracteata coastal gay-feather	G2	S2			ASTERACEAE Sunflower Family	Aransas, Brazoria, Galveston, Harris, Live Oak (H), Matagorda, Refugio and San Patricio counties
Liatris cymosa branched gay-feather	G2	S2	3C		ASTERACEAE Sunflower Family	Brazos, Burleson, Lee, Walker and Washington counties
Liatris tenuis slender gay-feather	G3	S3	FC2		ASTERACEAE Sunflower Family	Angelina, Hardin, Jasper, Newton, Orange, Sabine, San Augustine and Tyler counties; LA
Lycium texanum Texas wolf-berry	G2	S2	FC2		SOLANACEAE Potato Family	Brewster, Culberson and Hudspeth counties
Machaeranthera aurea Houston daisy	G2	S2	FC2		ASTERACEAE Sunflower Family	Galveston and Harris counties
Machaeranthera heterocarpa (see Psilactis heterocarpa)						

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Manfreda longiflora St. Joseph's staff	G2	S2	FC2		AGAVACEAE Agave Family	Cameron (H), Hidalgo and Starr counties; Tamaulipas
Manihot walkerae Walker's manioc	G1	S1	LE	E	EUPHORBIACEAE Spurge Family	Hidalgo and Starr counties; Tamaulipas
Matelea radiata Falfurrias milkvine	GH	SH	FC2		ASCLEPIADACEAE Milkweed Family	Brooks (H) and Hidalgo (H) counties
Matelea texensis Texas milkvine	G1	S1	FC2		ASCLEPIADACEAE Milkweed Family	Brewster County
Mimulus dentilobus fringed monkeyflower	G2	S1			SCROPHULARIACEAE Snapdragon Family	Presidio County; AZ and NM; Baja California, Chihuahua and Sonora
Neolloydia mariposensis (see Sclerocactus mariposensis)						
Nesaea longipes longstalk heimia	G2G3	S2			LYTHRACEAE Loosestrife Family	Brewster, Medina, Pecos and Val Verde counties; NM; Coahuila
Nolina arenicola sand sacahuista	G2Q	S2	FC2		AGAVACEAE Agave Family	Culberson, El Paso (?) and Hudspeth counties
Oenothera pilosella ssp. sessilis Grand Prairie evening primrose	G5T2	SH	FC2		ONAGRACEAE Evening Primrose Family	Galveston County (H); AR and LA
Opuntia arenaria sand prickly-pear	G2	S2	FC2		CACTACEAE Cactus Family	El Paso and Hudspeth (H) counties; NM; Chihuahua

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Opuntia aureispina golden-spine prickly-pear	G1Q	S1	FC2		CACTACEAE Cactus Family	Brewster County
Opuntia engelmannii var. flexospina few-spine Engelmann's prickly-pear	G5T1Q	S1	FC2		CACTACEAE Cactus Family	Starr, Webb (H) and Zapata counties
Opuntia imbricata var. argentea silver cholla	G5T1	S1	FC2		CACTACEAE Cactus Family	Brewster County
Opuntia macrocentra var. aureispina (see Opuntia aureispina)						
Osmorhiza mexicana ssp. bipatriata Livermore sweet-cicely	G5T1	S1	FC2		APIACEAE Carrot Family	Jeff Davis County; Coahuila and Nuevo León
Ostrya chisosensis Big Bend hop-hornbeam	G2	S1	FC2		BETULACEAE Birch Family	Brewster County; northern México
Oxypolis ternata threeleaf cowbane	G3	S1	FC2		APIACEAE Carrot Family	Hardin and Tyler (?) counties; FL, GA, MS, NC and SC
Paronychia congesta bushy whitlow-wort	G1	S1	C1		CARYOPHYLLACEAE Pink Family	Jim Hogg County
Paronychia lundellorum Lundell's whitlow-wort	G1	S1			CARYOPHYLLACEAE Pink Family	Brooks, Kenedy and Kleberg counties
Paronychia maccartii McCart's whitlow-wort	G1	S1	FC2		CARYOPHYLLACEAE Pink Family	Webb County
Paronychia wilkinsonii Wilkinson's whitlow-wort	G2	S2	FC2		CARYOPHYLLACEAE Pink Family	Brewster County; Chihuahua and Coahuila
Pediocactus papyracanthus (see Sclerocactus papyracanthus)						

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Pediomelum humile Rydberg's scurfpea	G1	S1	FC2		FABACEAE Legume Family	Val Verde County; Coahuila
Pediomelum pentaphyllum three-nerve scurfpea	G1	SH	FC2		FABACEAE Legume Family	Presidio County (H); AZ (H), NM; Chihuahua (H)
Pediomelum trinervatum (see Pediomelum pentaphyllum)						
Peniocereus greggii var. greggii desert night-blooming cereus	G4T2	S2	FC2		CACTACEAE Cactus Family	Brewster, El Paso, Hudspeth (H), Jeff Davis, Pecos (H), Presidio, Reeves and Terrell (H) counties; AZ and NM; Chihuahua and Zacatecas
Penstemon alamosensis Alamo beardtongue	G3	S1	FC2		SCROPHULARIACEAE Snapdragon Family	El Paso County; NM
Penstemon cardinalis ssp. regalis royal red penstemon	G3T2	S2			SCROPHULARIACEAE Snapdragon Family	Culberson and Jeff Davis counties; NM
Perityle bisetosa var. appressa appressed two-bristle rock-daisy	G2T2	S2			ASTERACEAE Sunflower Family	Brewster County; Coahuila
Perityle bisetosa var. bisetosa two-bristle rock-daisy	G2T2	S2	FC2		ASTERACEAE Sunflower Family	Brewster and Pecos counties
Perityle bisetosa var. scalaris stairstep two-bristle rock-daisy	G2T1	S1	FC2		ASTERACEAE Sunflower Family	Brewster County
Perityle cinerea grayleaf rock-daisy	G2	S2	3C		ASTERACEAE Sunflower Family	Pecos, Reeves (H), Terrell and Upton counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Perityle dissecta slimlobe rock-daisy	G2	S2			ASTERACEAE Sunflower Family	Brewster and Presidio counties; Chihuahua
Perityle fosteri Foster's rock-daisy	G1	S1			ASTERACEAE Sunflower Family	Culberson County
Perityle huecoensis Hueco rock-daisy	G1	S1	FC2		ASTERACEAE Sunflower Family	El Paso County
Perityle vitreomontana Glass Mountains rock-daisy	G1	S1	FC2		ASTERACEAE Sunflower Family	Brewster County
Perityle warnockii Warnock's rock-daisy	G1	S1	FC2		ASTERACEAE Sunflower Family	Val Verde County
Phacelia pallida pale phacelia	G2	S1	FC2		HYDROPHYLLACEAE Waterleaf Family	Brewster County; Chihuahua and Coahuila
Philadelphus crinitus bearded mock-orange	G2	S1			HYDRANGEACEAE Hydrangea Family	Jeff Davis County; AZ
Philadelphus ernestii canyon mock-orange	G2	S2	FC2		HYDRANGEACEAE Hydrangea Family	Blanco, Comal, Hays, Kendall and Travis counties
Philadelphus texensis Texas mock-orange	G2	S2	3C		HYDRANGEACEAE Hydrangea Family	Bandera, Comal (H), Edwards (H), Kendall (H), Medina (H), Real and Uvalde counties; Coahuila
Phlox nivalis ssp. texensis Texas trailing phlox	G4T2	S2	LE	E	POLEMONIACEAE Phlox Family	Hardin, Polk and Tyler counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Phyllanthus</u> <u>ericoides</u> heather leaf-flower	G2	S1	FC2		EUPHORBIACEAE Spurge Family	Brewster and Terrell counties; Chihuahua
<u>Physostegia</u> <u>correllii</u> Correll's false dragon-head	G2	S2	FC2		LAMIACEAE Mint Family	Bexar (H), Galveston, Montgomery (H), Travis, Val Verde and Zapata counties; LA; Coahuila, Nuevo León and Sonora
<u>Physostegia</u> <u>longisepala</u> long-sepaled false dragon-head	G2G3	S2	FC2		LAMIACEAE Mint Family	Hardin, Jasper, Newton, Orange and Tyler counties; LA
<u>Poa</u> <u>involuta</u> (see <u>Poa</u> <u>strictiramea</u>)						
<u>Poa</u> <u>strictiramea</u> desert mountains bluegrass	G3	S1	FC2		POACEAE Grass Family	Brewster County; Chihuahua, Coahuila, Durango, Nuevo León and Zacatecas
<u>Polemonium</u> <u>pauciflorum</u> ssp. <u>hinckleyi</u> Hinckley's Jacob's-ladder	G3T2Q	S1	FC2		POLEMONIACEAE Phlox Family	Jeff Davis County; AZ; Nuevo León and Sonora
<u>Polianthes</u> <u>runyonii</u> (see <u>Manfreda</u> <u>longiflora</u>)						
<u>Polygala</u> <u>maravillasensis</u> Maravillas milkwort	G2	S1	FC2		POLYGALACEAE Milkwort Family	Brewster and Terrell counties; Coahuila
<u>Polygala</u> <u>rimulicola</u> var. <u>rimulicola</u> rock crevice milkwort	G3T3	S2	3C		POLYGALACEAE Milkwort Family	Culberson and Hudspeth counties; NM
<u>Polygonella</u> <u>parksii</u> Parks' jointweed	G2	S2	3C		POLYGONACEAE Knotweed Family	Atascosa, Bexar, Burleson, Guadalupe, Leon, Milam, Robertson and Wilson counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Pomaria brachycarpa broadpod rushpea	G2	S2	FC2		FABACEAE Legume Family	Crockett (H), Edwards (H), Kinney and Sutton counties
Potamogeton clystocarpus Little Aguja pondweed	G1	S1	LE	E	POTAMOGETONACEAE Pondweed Family	Jeff Davis County
Proboscidea sabulosa dune unicorn-plant	G3	S2	3C		MARTYNIACEAE Unicorn-plant Family	Andrews, Crane, Loving, Ward and Winkler counties; NM; Chihuahua
Proboscidea spicata many-flowered unicorn-plant	G1	S1	FC2		MARTYNIACEAE Unicorn-plant Family	Brewster (H), Jeff Davis (H) and Presidio counties; Coahuila
Prunus murrayana Murray's plum	G2Q	S2	3C		ROSACEAE Rose Family	Brewster, Culberson (H) and Jeff Davis counties
Pseudoclappia watsonii Watson's false clappia-bush	G1	S1			ASTERACEAE Sunflower Family	Hudspeth and Jeff Davis counties
Psilactis heterocarpa Welder machaeranthera	G2	S2	FC2		ASTERACEAE Sunflower Family	Jackson, Kleberg, Nueces, Refugio, San Patricio and Victoria counties
Psoralea rydbergii (see Pediomelum humile)						
Psoralea trinervata (see Pediomelum pentaphyllum)						
Quercus boyntonii Boynton's oak	G1	SH	FC2		FAGACEAE Beech Family	Angelina County (H); AL
Quercus carmenensis Sierra del Carmen oak	G2	S1			FAGACEAE Beech Family	Brewster County; Coahuila
Quercus depressipes Mexican dwarf oak	G2	S1			FAGACEAE Beech Family	Jeff Davis County; Chihuahua and Durango

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Quercus graciliformis Chisos oak	G1	S1	FC2		FAGACEAE Beech Family	Brewster County
Quercus hinckleyi Hinckley's oak	G2	S2	LT	T	FAGACEAE Beech Family	Presidio County; Chihuahua
Quercus robusta robust oak	G1Q	S1			FAGACEAE Beech Family	Brewster County
Quercus tardifolia lateleaf oak	G1	S1	FC2		FAGACEAE Beech Family	Brewster County; Coahuila
Rhododon angulatus Tharp's rhododon	G1Q	S1			LAMIACEAE Mint Family	Aransas, Nueces and Refugio counties
Rorippa ramosa Durango yellow-cress	G2	S1			BRASSICACEAE Mustard Family	Brewster and Terrell counties; Chihuahua, Coahuila and Durango
Rudbeckia scabrifolia bog coneflower	G2G3	S2	FC2		ASTERACEAE Sunflower Family	Angelina, Jasper, Newton, Sabine and Shelby counties; LA
Salvia penstemonoides big red sage	G1	S1	FC2		LAMIACEAE Mint Family	Bandera, Bexar (H), Gillespie (H), Guadalupe (H), Kendall, Kerr (H), Real, Travis (I) and Wilson (H) counties
Schwalbea americana chaffseed	G2	SR	LE		SCROPHULARIACEAE Snapdragon Family	Texas (county unknown); AL, CT, DE, FL, GA, KY, LA, MA, MD, MS, NC, NJ, NY, SC, TN and VA
Sclerocactus mariposensis Lloyd's mariposa cactus	G2	S2	LT	T	CACTACEAE Cactus Family	Brewster County; Coahuila

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Sclerocactus papyracanthus paper-spine cactus	G3G4	S1	FC2		CACTACEAE Cactus Family	Hudspeth County; AZ and NM
Scutellaria laevis smooth-stem skullcap	G1	S1	FC2		LAMIACEAE Mint Family	Culberson and Hudspeth (H) counties
Sedum havardii Havard's stonecrop	G2	S2			CRASSULACEAE Orpine Family	Brewster and Jeff Davis (H) counties; Coahuila
Sedum robertsianum Roberts' stonecrop	G1Q	S1	FC2		CRASSULACEAE Orpine Family	Brewster County
Selaginella viridissima green spikemoss	G2	S1			SELAGINELLACEAE Spikemoss Family	Brewster and Jeff Davis counties; Coahuila
Senna orcuttii Orcutt's senna	G2	S2			FABACEAE Legume Family	Brewster and Terrell (H) counties; NM; Coahuila, Durango and Sonora
Senna ripleyana Ripley's senna	G1	SH	FC2		FABACEAE Legume Family	Brewster County (H); Chihuahua and Zacatecas
Sesuvium trianthemoides roughseed sea-purslane	GH	SH	FC2		AIZOACEAE Carpet-weed Family	Kenedy County (H)
Silene subciliata scarlet catchfly	G3	S3	FC2		CARYOPHYLLACEAE Pink Family	Hardin, Jasper, Jefferson (H), Liberty, Newton, Polk, Sabine, Shelby and Tyler counties; LA
Solanum leptosepalum Tigna potato	G2	S1			SOLANACEAE Potato Family	Jeff Davis and Presidio (H) counties; Chihuahua and Coahuila

Scientific Name Common Name	Rank* Global	Rank* State	Status** Federal	Status** State	Family	Distribution***
Sophora gypsophila var. guadalupensis Guadalupe Mountains mescal bean	G2G3 T2	S1	3C		FABACEAE Legume Family	Culberson County; NM
Spiranthes parksii Navasota ladies'-tresses	G3	S3	LE	E	ORCHIDACEAE Orchid Family	Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Madison, Milam, Robertson and Washington counties
Streptanthus bracteatus bracted twistflower	G2	S2	FC2		BRASSICACEAE Mustard Family	Bandera, Bexar, Caldwell (?), Comal, Medina, Real, Travis and Uvalde counties
Streptanthus cutleri Cutler's twistflower	G2	S2	FC2		BRASSICACEAE Mustard Family	Brewster County; Coahuila
Streptanthus sparsiflorus sparsely-flowered jewelflower	G2	S2	FC2		BRASSICACEAE Mustard Family	Culberson County; NM
Styrax platanifolius ssp. texanus Texas snowbells	G3T1	S1	LE	E	STYRACACEAE Storax Family	Edwards, Uvalde (I), Real and Val Verde counties
Styrax platanifolius ssp. youngiae Young's snowbells	G3T1	SH	FC2		STYRACACEAE Storax Family	Jeff Davis County (H); Coahuila and Nuevo León
Styrax texanus (see Styrax platanifolius ssp. texanus)						
Styrax youngiae (see Styrax platanifolius ssp. youngiae)						
Symphoricarpos guadalupensis McKittrick snowberry	GHQ	SH	FC2		CAPRIFOLIACEAE Honeysuckle Family	Culberson County (H)
Thalictrum arkansanum Arkansas meadow-rue	G2Q	S1	FC2		RANUNCULACEAE Buttercup Family	Bowie, Cass, Grayson (?), Lamar and Red River counties; AR and OK

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Thalictrum</u> <u>texanum</u> Texas meadow-rue	G2Q	S2	FC2		RANUNCULACEAE Buttercup Family	Brazos, Fayette (H), Grimes, Harris (H) and Waller counties
<u>Thelocactus</u> <u>bicolor</u> var. <u>flavidispinus</u> straw-spine glory-of-Texas	G4T2	S2	FC2		CACTACEAE Cactus Family	Brewster and Starr (M) counties; Tamaulipas
<u>Thelypodium</u> <u>tenue</u> Fresno Creek thelypody	GHQ	SH	FC2		BRASSICACEAE Mustard Family	Presidio County (H)
<u>Thurovia</u> <u>triflora</u> threeflower broomweed	G2	S2			ASTERACEAE Sunflower Family	Aransas, Brazoria, Calhoun, Galveston, Harris, Jackson, Matagorda, Refugio, San Patricio (H) and Waller (H) counties
<u>Thymophylla</u> <u>tephroleuca</u> ashy dogweed	G2	S2	LE	E	ASTERACEAE Sunflower Family	Starr (H), Webb and Zapata counties
<u>Tillandsia</u> <u>baileyi</u> Bailey's ballmoss	G2	S2	FC2		BROMELIACEAE Bromeliad Family	Brooks (H), Cameron, Hidalgo, Jim Wells, Kenedy, Kleberg and Willacy counties; Tamaulipas
<u>Tomanthera</u> <u>auriculata</u> auriculate false foxglove	G3	SX	FC2		SCROPHULARIACEAE Snapdragon Family	Tarrant County (X); AL, AR, IA, IL, IN (H), KS, MD (H), MI, MN (H), MO, MS, NJ (H), OH, OK, PA, SC, TN, VA (H), WI (H) and WV
<u>Toumeya</u> <u>papyracantha</u> (see <u>Sclerocactus</u> <u>papyracanthus</u>)						
<u>Tradescantia</u> <u>pedicellata</u> granite spiderwort	G2	S2			COMMELINACEAE Dayflower Family	Blanco, Burnet, Llano and Mason counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
Trillium pusillum var. texanum Texas trillium	G3T2 T3Q	S2S3	FC2		LILIACEAE Lily Family	Angelina, Cass, Cherokee, Harrison, Houston (H), Jasper, Nacogdoches, Panola (H), Rusk, Smith and Wood (?) counties; LA
Trillium texanum (see Trillium pusillum var. texanum)						
Valerianella texana Edwards Plateau cornsalad	G2	S2	FC2		VALERIANACEAE Valerian Family	Burnet, Gillespie and Llano counties
Viola guadalupensis Guadalupe Mountains violet	G1	S1	FC2		VIOLACEAE Violet Family	Culberson County
Xyris drummondii Drummond's yellow-eyed grass	G3	S2	FC2		XYRIDACEAE Yellow-eyed Grass Family	Angelina, Jasper and Newton counties; AL, FL, GA, LA and MS
Xyris scabrifolia rough-leaf yellow-eyed grass	G3	S2	FC2		XYRIDACEAE Yellow-eyed Grass Family	Angelina, Henderson, Jasper, Newton and Sabine counties; AL, FL, GA, LA, MS and NC
Yucca necopina Glen Rose yucca	G1Q	S1			AGAVACEAE Agave Family	Hood, Parker, Somervell and Tarrant counties
Zanthoxylum parvum Shinners' tickle-tongue	G2	S2			RUTACEAE Citrus Family	Brewster and Jeff Davis counties
Zizania texana Texas wild-rice	G1	S1	LE	E	POACEAE Grass Family	Hays County

Explanation of Terms and Symbols

*Rank- Two ranking categories are provided for each plant as follows:

Global Rank (denoted by G and a number, 1-5 or H)

G1 = less than 6 occurrences known globally; critically imperiled, especially vulnerable to extinction
G2 = 6-20 occurrences known globally; imperiled and very vulnerable to extinction throughout its range
G3 = 21-100 occurrences known globally; either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region), or because of other factors making it vulnerable to extinction throughout its range areas of the state
G4 = more than 100 occurrences known; apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery
G5 = demonstrably secure globally, though it may be quite rare in parts of its range
GH = of historical occurrence throughout its range, i.e., formerly part of the established biota, with expectation that it may be rediscovered

State Rank (denoted by S and a number, 1-5 or H)

S1 = less than 6 occurrences known in Texas; critically imperiled in Texas; especially vulnerable to

S2 = 6-20 known occurrences in Texas; imperiled in the state because of rarity; very vulnerable to

S3 = 21-100 known occurrences in Texas; either rare or uncommon in the state
S4 = more than 100 occurrences in Texas; apparently secure in the state, though it may be quite rare

S5 = demonstrably secure in Texas
SH = historical in Texas, not verified within the past 50 years but suspected to be extant
SR = reported from Texas in literature but not verified via specimens or field observations
SX = presumed extirpated from Texas

A global or state rank followed by "Q" indicates that the taxonomic status of the plant is a matter of conjecture. A rank followed by "?" indicates that the rank is not certain. A "T" subrank following a global rank denotes the rank for subspecific taxa. Two G or S ranks together (G2G3; S1S2; etc.) indicate that the plant is borderline between the ranks. All state and most global ranks are assigned by the Texas Natural Heritage Program.

**Status- Two status categories are provided for each plant as follows:

Federal Legal Status (according to the United States Fish & Wildlife Service)

LE = federally listed as an endangered plant
LT = federally listed as a threatened plant
PE = proposed to become listed as endangered
PT = proposed to become listed as threatened
C1 = category 1 candidate for listing as threatened or endangered
FC2 = formerly a Category 2 candidate for possible listing; some are considered "species of concern"
3B = no longer considered taxonomically valid
3C = no longer under federal review for listing; either more abundant or widespread than was previously thought
DL = de-listed

State Legal Status (according to the Texas Parks & Wildlife Department)

E = listed as a state endangered plant
T = listed as a state threatened plant

***Distribution

Abbreviations for states in the U.S. are those of the U.S. Postal Service. Alphabetical qualifiers following counties or states are defined as follows: H = historical (not observed or collected within 50 years); I = introduced; M = misidentification; X = presumed extirpated; and ? = questionable locality or identification.

This list is produced jointly by the Wildlife Diversity Program of the Texas Parks and Wildlife Department and the Texas Conservation Data Center of The Nature Conservancy of Texas. It is reviewed periodically and necessary revisions are incorporated. Should you have any comments or questions regarding this list, please contact the Wildlife Diversity Program, Texas Parks and Wildlife Department, 3000 IH 35-S, Suite 100, Austin, TX 78704, (512) 912-7011; or The Nature Conservancy of Texas, P. O. Box 1440, San Antonio, Texas, 78205-1721, (210) 224-8774.

PLANT COMMUNITIES OF TEXAS (SERIES LEVEL)
Texas Natural Heritage Program, April 1993

Alkali Sacaton-Fourwing Saltbush Series (G4S3)
(Sporobolus airoides-Atriplex canescens)
This grassland or shrubland community type occurs primarily over saline soils in the Trans-Pecos, High Plains, and South Texas Plains. Composition varies with salinity, water relations, and disturbance. Important species include frankenia (Frankenia jamesii), alkali muhly (Muhlenbergia asperifolia), and saltgrass (Distichlis spicata). The community may grade into the mesquite-fourwing saltbush (Prosopis glandulosa-Atriplex), tobosa (Hilaria mutica), or various desert shrubland series on drier, less saline soils. On wetter or more saline soils this type may form landscape mosaics with the saltgrass-Olney bulrush (Distichlis spicata-Scirpus olneyi) and pickleweed-seepweed (Allenrolfea occidentalis-Suaeda spp.) series. The big alkali sacaton (Sporobolus wrightii) series, which is mainly restricted to the area near the mouth of the Rio Grande, is a closely related grassland.

American Beech-Southern Magnolia Series (G3S2)
(Fagus grandifolia-Magnolia grandiflora)
This forest community type is restricted to the southern portion of the East Texas Pineywoods. Soils are usually well drained but mesic, and the topography is often rolling. The topographic position is generally a mesic slope or shallow creek bottom. Loblolly pine (Pinus taeda), American holly (Ilex opaca), laurel oak (Quercus laurifolia), sweetgum (Liquidambar styraciflua), and white oak (Quercus alba) are often present. Upslope this type often grades into pine-oak communities, while downslope it usually grades into oak-dominated bottomlands or seepy creek bottoms with sweetbay magnolia (Magnolia virginiana).

American Beech-White Oak Series (G3S2)
(Fagus grandifolia-Quercus alba)
This mesic, calciphilic forest occupies ravines and ridges within creek bottoms, mostly in southeast Texas. Acid-loving species such as southern magnolia (Magnolia grandiflora) are absent, and a rich vernal calciphilic forest floor flora is present. Representative species include bigleaf snowbells (Styrax grandifolia), bluestem goldenrod (Solidago caesia), and chalk maple (Acer leucoderme). This type may grade into the sweetbay magnolia (Magnolia virginiana) series downslope in mesic canyons, and into oak or oak-pine forests upslope.

Apache-plume Series (G4S4)
(Fallugia paradoxa)
This deciduous shrubland occurs primarily along arroyos in the Trans-Pecos. Soils and drainage are variable, and composition varies with these plus elevation and cultural influences. Components include splitleaf brickellbush (Brickellia laciniata), granjeno (Celtis pallida), desert willow (Chilopsis linearis),

catclaw acacia (Acacia greggii), mesquite (Prosopis glandulosa), and sumac (Rhus microphylla, R. virens). It is intermixed on the landscape with other desert shrubland and grassland communities.

Ashe Juniper-Oak Series (G4S4)
(Juniperus ashei-Quercus spp.)
This evergreen shrubland or woodland primarily inhabits shallow-soiled, sloping sites over limestone in the Edwards Plateau. Disturbed areas over deeper soils on flat uplands may also support this community. It circumscribes a fairly wide degree of variation, and on dry sites may form an open shrubland with midgrasses and xeromorphic shrubs or may form closed canopy woodlands or low forest on more favorable sites. Texas, scalybark, scrub, and plateau live oaks (Quercus buckleyi, Q. sinuata var. breviloba, Q. pungens, Q. fusiformis) along with evergreen sumac (Rhus virens) and agarito (Berberis trifoliolata) are components. To the west and north this type may grade into the redberry (Pinchot) juniper (Juniperus pinchotii)-midgrass series. This community type forms landscape mosaics with plateau live oak woodland and grasslands on uplands and deciduous oak woodlands on adjacent mesic slopes.

Baldcypress-Sycamore Series (G3S3)
(Taxodium distichum-Platanus occidentalis)
This mainly deciduous forest occurs as gallery forests along narrow floodplains and channels of perennial streams, primarily along the southern and southeastern margins of the Edwards Plateau, but also forms a gallery along streams to the south and east. Texas or Lacey oak (Quercus buckleyi, Q. laceyi) deciduous woodlands and evergreen Ashe juniper (Juniperus ashei) woodlands often inhabit the same canyons.

Baldcypress-Water Tupelo Series (G4S3)
(Taxodium distichum-Nyssa aquatica)
This deciduous swamp forest occupies hydric soils in east Texas. Composition depends on depth and duration of flooding and on past disturbance, with water tupelo often present in the deepest water or in cut-over swamp, and species such as blackgum (Nyssa sylvatica), overcup oak (Quercus lyrata), water hickory (Carya aquatica), and ash (Fraxinus caroliniana, F. pensylvanica) present in shallow or less frequently flooded areas. Minor elevational differences can cause marked variation in depth and frequency of flooding, and hence vegetation. Oak-dominated bottomland hardwood communities and shrub swamps may interdigitate with this type.

Big Sacaton Series (G4S3)
(Sporobolus wrightii)
This tall, saline grassland or marsh series is best represented north of the mouth of the Rio Grande in Cameron County. It forms a mosaic with loma thorn shrublands within the Texas ebony-snake-eyes (Pithecellobium flexicaule-Phaulothamnus spinescens) series, tidal flats in the glasswort-saltwort (Salicornia bigelovii/S.

virginica-Batis maritima) series, and cordgrass (Spartina spartinae, S. patens) marshes. Seacoast bluestem (Schizachyrium scoparium var. littoralis) and Paspalum species may be components. Cordgrass marshes or herb dominated communities may occur on wetter, more saline soils seaward of this community type, and it forms landscape mosaics with subtropical shrublands on lomas in the Lower Rio Grande Valley.

Bigtooth Maple-Oak Series (G4S2)
(Acer grandidentatum-Quercus spp.)
This deciduous forest is isolated in mesic canyon bottoms of the southern Edwards Plateau and mountains of the Trans-Pecos. Bigtooth maple is often mono-dominant. Associated species vary with geographic location, with Lacey oak (Quercus laceyi), chinkapin oak (Quercus muhlenbergii), Texas oak (Quercus buckleyi), Ashe juniper (Juniperus ashei), and black cherry (Prunus serotina subsp. eximia) important on the Edwards Plateau, and gray oak (Quercus grisea), one-seed juniper (Juniperus monosperma), alligator juniper (Juniperus deppeana), pinyon pine (Pinus edulis), Chisos red oak (Quercus gravesii), and Texas madrone (Arbutus xalapensis) present in the Chisos Mountains. Adjacent slopes are usually oak-juniper dominated.

Black Mangrove Series (G5S2)
(Avicennia germinans)
This salt swamp series is limited to stands along the Gulf coast, from Galveston Bay to the Rio Grande. Even in the far south, mangrove is subject to periodic die-back because of freezing temperatures. The community type is pantropical, extending worldwide from 30 N to 30 S latitude. It is intermixed with the smooth cordgrass (Spartina alterniflora) and the glasswort-saltwort (Salicornia bigelovii/S. virginica-Batis maritima) series.

Blackbrush Series (G5S5)
(Acacia rigidula)
This shrubland occupies uplands, primarily over shallow soils, in the South Texas Plains. A variety of shrubs may be important, depending on soils, slope, and cultural influences. Mesquite (Prosopis glandulosa), guajillo (Acacia berlandieri), granjeno (Celtis pallida), lotebush (Ziziphus obtusifolia), Acacia spp., and other species may be present. This series is intermixed with the guajillo, mesquite-granjeno, and cane bluestem-false rhodesgrass (Bothriochloa barbinodis-Chloris pluriflora) series, and grades into subtropical ebony-dominated (Pithecellobium flexicaule) shrublands in the lower Rio Grande Valley.

Blue Grama-Buffalograss Series (G4S3)
(Bouteloua gracilis-Buchloe dactyloides)
This shortgrass grassland occupies typical upland soils, primarily in the central and northern High Plains, but also the Trans-Pecos and Rolling Plains. Mesquite (Prosopis glandulosa) is often a component, along with a variety of mid- and short grasses such as

sideoats grama (Bouteloua curtipendula), sand dropseed (Sporobolus cryptandrus), and Aristida spp. This community type grades into midgrass communities on more mesic sites.

Bluejack Oak-Pine Series (G4S2)
(Quercus incana-Pinus spp.)
This mainly deciduous woodland usually occupies island-like patches or ridges of deep, sandy soils in east Texas. Longleaf pine (Pinus palustris) and shortleaf pine (Pinus echinata) are important in the south and east, but longleaf pine is not a component in the north and west. Other common components include southern red oak (Quercus falcata), post oak (Quercus stellata), blackjack oak (Quercus marilandica), black hickory (Carya texana), farkleberry (Vaccinium arboreum), gum bumelia (Bumelia lanuginosa), and yaupon (Ilex vomitoria). Surrounding upland woodlands and forests on heavier textured soils are oak-hickory or oak-pine dominated.

Buttonbush Series (G4S4)
(Cephalanthus occidentalis)
This shrub swamp occurs primarily in the eastern half of Texas. Composition varies with flooding regime and location, and black willow (Salix nigra), ash (Fraxinus pensylvanica, F. caroliniana), smooth alder (Alnus serrulata), swamp privet (Forestiera acuminata), and baldcypress (Taxodium distichum) may be present. This type often intermixes with marsh types and grades into the water elm-swamp privet (Planera aquatica-Forestiera acuminata) series in southeast Texas.

Cane Bluestem-False Rhodesgrass Series (G3S3)
(Bothriochloa barbinodis-Chloris pluriflora)
This midgrass grassland once occupied uplands in the South Texas Plains, but overgrazing and brush clearing have almost eliminated the type. Gramas (Bouteloua spp.), bristlegrass (Setaria spp.), pink pappusgrass (Pappophorum bicolor), buffalograss (Buchloe dactyloides), and curlymesquite (Hilaria belangeri) are components on better quality rangeland. Most of this community type is now dominated by shrubs such as mesquite (Prosopis glandulosa), prickly pear (Opuntia spp.), huisache (Acacia smallii), and blackbrush (Acacia rigidula) or has been converted to cropland or tame pasture.

Ceniza Series (G4S4)
(Leucophyllum frutescens)
This shrubland occurs over shallow soils on hills near the Rio Grande, on the Stockton Plateau, and on the South Texas Plains. A variety of shrubs including Calliandra conferta, guajillo (Acacia berlandieri), blackbrush (Acacia rigidula), and lotebush (Ziziphus obtusifolia) may be present. This community type usually grades into blackbrush, guajillo, or mesquite (Prosopis glandulosa) dominated shrubland.

Coastal Live Oak-Pecan Series (G3S3)
(Quercus virginiana-Carya illinoinensis)
This mainly evergreen to mainly deciduous upland woodland is restricted to the eastern half of the Upper Coastal Prairie, usually over heavy textured, neutral or basic soils. Sugarberry (Celtis laevigata), post oak (Quercus stellata), and cedar elm (Ulmus alata) may occur in the overstory, while yaupon (Ilex vomitoria) and hawthorn (Crataegus spp.) are important in the understory. More mesic sites along river floodplains are in the water oak-coastal live oak (Quercus nigra-Q. virginiana) series, while adjacent acid, clay pan soils are often in the coastal live oak-post oak (Q. virginiana-Q. stellata) series.

Coastal Live Oak-Post Oak Series (G4S4)
(Quercus virginiana-Quercus stellata)
This mainly deciduous to mainly evergreen upland woodland occupies acid, sandy, usually clay pan soils along the northern rim of the Coastal Prairie and the far southwestern Post Oak Savannah. Blackjack Oak (Quercus marilandica), Crataegus spp., yaupon (Ilex vomitoria), and grasses such as little bluestem (Schizachyrium scoparium) and brownseed paspalum (Paspalum plicatulum) may be important. Composition ranges from mostly live oak to mainly post oak and blackjack oak with scattered live oak. Adjacent communities include water oak (Quercus nigra)-live oak on river floodplains, live oak-pecan (Carya illinoinensis) over clayey soils, and little bluestem-brownseed paspalum (Schizachyrium scoparium-Paspalum plicatulum) on adjacent grasslands.

Coastal Live Oak-Redbay Series (G3S3)
(Quercus virginiana-Persea borbonia)
This evergreen/deciduous woodland occupies deep often hummocky sands mostly on the Ingleside Barrier along the Texas Gulf Coastal Bend. Live oak is the most important canopy species, with redbay, coastal laurel oak (Quercus hemisphaerica), American beautyberry (Callicarpa americana), and yaupon (Ilex vomitoria) common in the shrub layer. In some areas the overstory is absent and rhizomatous oaks form dense thickets, and waxmyrtle (Myrica cerifera) is often present in poorly drained areas. Important components of associated grasslands include little bluestem (Schizachyrium scoparium), brownseed paspalum (Paspalum plicatulum), big bluestem (Andropogon gerardii), and Indiangrass (Sorghastrum nutans), with gulfdune paspalum (Paspalum monostachyum) important in swales.

Coastal Live Oak-Sugarberry Series (G3S3)
(Quercus virginiana-Celtis laevigata)
This essentially maritime woodland or forest generally occurs along the upper Gulf coast, including chenier woodlands east of Galveston Bay. Composition varies with soil texture and geographic distribution, with yaupon (Ilex vomitoria), cedar elm (Ulmus crassifolia), ash (Fraxinus spp.), and redbay (Persea borbonia), variously present. Little bluestem (Schizachyrium scoparium) grasslands are often intermixed with this series, and it is closely

related to the coastal live oak-pecan series, which is restricted to the Upper Coastal Prairie.

Cottonwood-Tallgrass Series (G2S2)
(Populus deltoides)
This tallgrass community type inhabits sub-irrigated creek bottoms and swales, usually between dunes, in the panhandle of Texas. Big bluestem (Andropogon gerardii), switchgrass (Panicum virgatum), gamagrass (Tripsacum dactyloides), Indiangrass (Sorghastrum nutans), and alkali sacaton (Sporobolus airoides) are variously important. Seeps and marshes may be included, and surrounding dunes are Havard shin oak (Quercus havardii)-little bluestem or sandsage (Artemisia filifolia)-midgrass grasslands or shrublands.

Cottonwood-Willow Series (G3S3)
(Populus sp.-Salix sp.)
This deciduous forest community type once occupied the floodplains of perennial streams in the Trans-Pecos, but has mostly been replaced by disturbance types. Taxonomic nomenclature of cottonwood and willow species is uncertain, but taxa now or formerly referred to as Fremont cottonwood (Populus fremontii) and Gooding willow (Salix gooddingii) are important, as well as Rio Grande cottonwood (Populus wislizenii) and other willow species (Salix lasiolepis, S. exigua, S. amygdaloides). Berlandier ash (Fraxinus berlandieri), netleaf hackberry (Celtis reticulata), and little walnut (Juglans microcarpa) are often present. This series is similar to the velvet ash (Fraxinus velutina)-Goodding willow series found in mesic Trans-Pecos mountain canyons.

Creosotebush-Mariola Series (G5S5)
(Larrea tridentata-Parthenium incanum)
This desert shrubland inhabits low elevations (3500 ft) in the Chihuahuan Desert in the Trans-Pecos. Tarbush (Florensia cernua), whitethorn acacia (Acacia neovernicosa, A. constricta), mesquite (Prosopis glandulosa), lechuguilla (Agave lechuguilla), granjeno (Celtis pallida), cacti, and short grasses such as chino and black grama (Bouteloua breviseta, B. eriopoda) may be present. This community is intermixed with other desert shrubland and grassland communities.

Creosotebush Series (G5S5)
(Larrea tridentata)
This xeromorphic shrubland inhabits low elevation (below 3500 ft), flats in the Trans-Pecos. It is also a widespread disturbance type that has spread into former desert grasslands and mixed shrublands. Important species may include mariola (Parthenium incanum), fourwing saltbush (Atriplex canescens), tarbush (Florensia cernua), cacti, and Acacia spp., although many areas contain few additional species. The community type is intermixed with other desert shrublands.

Curlymesquite-Sideoats Grama Series (G3S3)
(Hilaria belangeri-Bouteloua curtipendula)
This midgrass grassland inhabits typical upland soils of the central and western Edwards Plateau. Curlymesquite may also dominate grazed grasslands throughout the Edwards Plateau. Woody species, including plateau live oak (Quercus virginiana), Ashe juniper (Juniperus ashei), and scalybark oak (Quercus sinuata var. breviloba) are often components along with a variety of grasses such as tridens (Tridens albescens, T. muticus), seep muhly (Muhlenbergia reverchonii), little bluestem (Schizachyrium scoparium), and Texas cupgrass (Eriochloa sericea). This community type is intermixed with the plateau live oak-midgrass and Ashe juniper-oak series, and grasslands on wetter sites or to the west are dominated by little bluestem.

Douglas Fir-Pine Series (G4S1)
(Pseudotsuga menziesii-Pinus spp.)
This evergreen forest is restricted to high elevations in the Guadalupe and Chisos Mountains of the Trans-Pecos. Important components include ponderosa pine (Pinus ponderosa), southwestern white pine (Pinus strobiformis - Guadalupe), and Arizona cypress (Cupressus arizonica - Chisos). It is a common Rocky Mountain community type, and downslope grades into the ponderosa pine (Pinus ponderosa) series.

Emory Oak Series (G4S4)
(Quercus emoryi)
This semi-evergreen woodland is found at moderate elevations (4500-5500) in the Trans-Pecos mountains, especially over alluvial soils in mountain valleys. Gray oak (Quercus grisea) is a component on drier sites, while more mesic adapted species such as Chisos red oak (Quercus gravesii), Chisos oak (Quercus graciliformis; Chisos Mountains), and bigtooth maple (Acer grandidentatum) may be present on sub-irrigated sites. Junipers (Juniperus deppeana, J. pinchotii) may also be important. This type is intermixed with mid-grass grassland in the New Mexico little bluestem series (Schizachyrium scoparium var. neomexicana) or the black grama-sideoats grama (Bouteloua eriopoda-B. curtipendula) series, and adjacent steep mountain slopes are often in the pinyon-oak (Pinus cembroides/P. edulis-Quercus spp.) series.

Gamagrass-Switchgrass Series (G2S1)
(Tripsacum dactyloides-Panicum virgatum)
This tallgrass grassland is found primarily in lowlands or poorly-drained uplands over clayey soils in the Blackland, Fayette, and Upper Coastal Prairies. Indiangrass (Sorghastrum nutans), little bluestem (Schizachyrium scoparium), tall dropseed (Sporobolus asper), heath aster (Aster ericoides), Maximilian sunflower (Helianthus maximiliani), and other grasses and forbs may be important. This type occurs as isolated remnants, often surrounded by cropland.

Glasswort-Saltwort Series (G4S4)
(Salicornia bigelovii/S. virginica-Batis maritima)
This open herb dominated community type occupies alternately wet and dry, saline soils, often of wind tidal flats along the Gulf Coast. Important species may include shoregrass (Monanthochloe littoralis), camphor daisy (Machaeranthera phyllocephala), sea ox-eye daisy (Borrichia frutescens), seepweed (Suaeda spp.), cenicilla (beach purslane, Sesuvium portulacastrum), and seashore dropseed (Sporobolus virginicus). This community type forms mosaics with cordgrass (Spartina alterniflora, S. patens, S. spartinae) and saltgrass (Distichlis spicata) marshes along the Gulf coast.

Gray Oak-Oak Series (G4S4)
(Quercus grisea)
This mainly deciduous oak woodland is restricted to a few locations in relatively mesic canyons of the mountains in the southern Trans-Pecos. Chisos red oak (Quercus gravesii), Mexican blue oak (Q. oblongifolia), Mexican pinyon pine (Pinus cembroides), and Juniperus spp. may be present. As defined, this type is similar to the pinyon pine-oak series, but is more strongly dominated by oaks rather than pine and juniper.

Guajillo Series (G5S5)
(Acacia berlandieri)
This deciduous shrubland occupies rocky slopes and is also a widespread disturbance type of the South Texas Plains and the Stockton Plateau. Composition varies with soils, slope, and past history, with blackbrush (Acacia rigidula), ceniza (Leucophyllum frutescens), lotebush (Ziziphus obtusifolia), mesquite (Prosopis glandulosa), twisted acacia (Acacia schaffneri), and a variety of additional shrub species variously important. This type is intermixed with the blackbrush series and other shrublands on the South Texas Plains.

Gulf Cordgrass Series (G4S4)
(Spartina spartinae)
This fresh to slightly salty marsh occurs along the gulf coast, in the Coastal Sand Plain, and is also isolated inland. Composition varies with salinity and drainage, and sedges, seacoast bluestem (Schizachyrium scoparium var. littoralis), switchgrass (Panicum virgatum), bushy bluestem (Andropogon glomeratus), bristlegrass (Setaria spp.), and other grasses are intermixed. This series grades into upland little bluestem-brownseed paspalum (Schizachyrium scoparium-Paspalum plicatulum) grassland or, over sandy soils, seacoast bluestem-gulfdune paspalum (Paspalum monostachyum) grassland, and into salty marsh with marshhay cordgrass (Spartina patens) and saltgrass (Distichlis spicata) downslope.

Havard Shin Oak-Tallgrass Series (G3S3)
(Quercus havardii)
This broadly-defined, mainly evergreen shrubland or tall grassland

is isolated on stabilized dunes in the Panhandle, High Plains, and far northeastern Trans-Pecos (Monahans-Kermit Sand Hills). Composition varies with precipitation and with the depth and degree of stabilization of the dunes. In the Trans-Pecos large areas of degraded sand sheet are dominated by nearly continuous stands of Havard shin oak (Quercus havardii), while a few areas of open, destabilized dunes are present. To the north large areas of open grassland with scattered patches of oaks occur. Little bluestem (Schizachyrium scoparium), sand bluestem (Andropogon gerardii var. chrysocomus), switchgrass (Panicum virgatum), sand and giant dropseed (Sporobolus cryptandrus, S. giganteus), giant sandreed (Calamovilfa gigantea), three-awns (Aristida spp.), plains yucca (Yucca campestris), mesquite (Prosopis glandulosa), sumac (Rhus spp.), plum (Prunus spp.), and sandsage (Artemisia filifolia) may be present. Interdunal drainages may support tallgrass meadows in the northern Panhandle.

Lacey Oak Series (G3S3)
(Quercus laceyi)
This deciduous woodland occupies canyon slopes in the southern, especially the southwestern, Edwards Plateau (Balcones Canyonlands). Texas oak (Quercus buckleyi), cedar elm (Ulmus crassifolia), chinkapin oak (Quercus muhlenbergii), live oak (Quercus fusiformis), and Ashe juniper (Juniperus ashei) are often important. Baldcypress (Taxodium distichum) dominated streams may occur in the same canyons and Ashe juniper evergreen woodlands occupy adjacent dry slopes. This community type is similar to the Texas oak series, which occupies similar habitats to the east.

Lechuguilla-Sotol Series (G4S4)
(Agave lechuguilla-Dasylirion leiophyllum)
This succulent xeromorphic (desert) shrubland inhabits slopes, usually with shallow, rocky soils at low to moderate elevations (below 4500 ft) in the Trans-Pecos. Grasses such as chino grama (Bouteloua breviseta), black grama (B. eriopoda), sideoats grama (B. curtipendula), Warnock grama (B. warnockii), and tobosa (Hilaria mutica) are plentiful, as are a variety of desert shrubs. This type may grade into semi-desert grassland upslope and other desert shrublands downslope.

Little Bluestem-Brownseed Paspalum Series (G2S2)
(Schizachyrium scoparium-Paspalum plicatulum)
This tallgrass grassland occupies uplands of the Coastal Prairie and loamy soils of the Fayette Prairie. Indiangrass (Sorghastrum nutans), tall dropseed (Sporobolus asper), bristlegrasses (Setaria spp.), big bluestem (Andropogon gerardii), hairyawn muhly (Muhlenbergia capillaris), fimbry (Fimbristylis puberula), and a variety of forbs and sedges may be important. To the north similar habitats are occupied by Blackland Prairie tallgrass communities, while gulfward the type contacts coastal marshes, especially the gulf cordgrass (Spartina spartinae) series.

Little Bluestem-Indiangrass Series (G2S2)
(Schizachyrium scoparium-Sorghastrum nutans)
This broadly defined upland tallgrass grassland once occurred throughout the Blackland, Fayette, and Grand Prairies, but is now restricted to small, isolated relicts. Composition of secondary species varies rather distinctly with soil type (clayey Vertisols versus loamy Alfisols). Tall dropseed (Sporobolus asper), big bluestem (Andropogon gerardii), sideoats grama (Bouteloua curtipendula), fimbry (Fimbristylis puberula), Carex microdonta, Florida paspalum (Paspalum floridanum), and other grasses and sedges may be important, along with a variety of forbs such as Maximilian sunflower (Helianthus maximiliani), heath aster (Aster ericoides), and Mexican hat (Ratibida columnaris). Bottomlands of the prairies are wooded or support a gamagrass-switchgrass (Tripsacum dactyloides-Panicum virgatum) community type.

Little Bluestem-Nuttall's Rayless Goldenrod Series (G3S3)
(Schizachyrium scoparium-Bigelowia nuttallii)
This open grassland or forb-dominated barren community type is restricted to flat, shallow-soil areas, especially of the tuffaceous member of the Catahoula Formation in the southern portion of the East Texas Pineywoods and Post Oak Savannah. The shallow, nutrient poor soils and fluctuating extractable water suggest that these are sites distinguished by stressful environmental conditions. Juxtaposition of xeric-adapted plants and plants adapted to seasonally saturated soils is indicative of the specialized barrens habitat. Important herbaceous species may include Silveus dropseed (Sporobolus silveanus), Kearney three-awn (Aristida longespica), and narrow-leaf rushfoil (Crotonopsis linearis); cladonia lichens (Cladonia spp.) also are common components. Barrens are often interspersed within deciduous woodlands within the post oak-black hickory (Quercus stellata-Carya texana) series, or occur below hillside seepage-bogs (Sphagnum-beakrush series) or within dry longleaf pine savannas (longleaf pine--little bluestem series).

Loblolly Pine-Oak Series (G4S4)
(Pinus taeda-Quercus spp.)
This upland, mainly deciduous forest occurs primarily over sandy or loamy, low Ph soils in east Texas. Some combination of post, southern red, white, and water oaks (Quercus stellata, Q. falcata, Q. alba, Q. nigra) and other hardwoods is dominant in old growth communities along with loblolly and shortleaf pines (Pinus taeda, P. echinata) and hickories (Carya spp.). Understory species include flowering dogwood (Cornus florida), yaupon (Ilex vomitoria), wax-myrtle (Myrica cerifera), and American beautyberry (Callicarpa americana). This community type is wide-ranging, often occurs as a second growth or disturbance type after logging, and thus is highly variable. To the south it grades toward longleaf pine (Pinus palustris) types, on mesic sites to various hardwood types, and to the north or on deep, sandy soils, to shortleaf pine or bluejack oak types.

Longleaf Pine-Beakrush Series (G3S2)
(*Pinus palustris*-*Rhynchospora* spp.)
This poorly drained, mainly evergreen woodland once occupied the southern extension of longleaf pine communities in southeast Texas, primarily over the Montgomery Formation. Under a frequent burning regime, herbaceous vegetation forms the matrix for scattered pines. Important species include beakrushes (*Rhynchospora plumosa*, *R. gracilenta*, *R. globularis*), sedges (*Fimbristylis* spp., *Scleria* spp.), yellow-eyed grass (*Xyris* spp.), and grasses (*Panicum virgatum*, *Schizachyrium* spp., *Panicum* spp., *Paspalum* spp.). Shrub and tree density generally increases as the frequency of fire decreases, with species such as blackgum (*Nyssa sylvatica*), wax-myrtle (*Myrica cerifera*), sweetgum (*Liquidambar styraciflua*), and yaupon (*Ilex vomitoria*) important. This type may support inclusions of evergreen forest (sweetbay magnolia series) and swamp, and to the north grades into upland longleaf pine communities over the Bentley formation.

Longleaf Pine-Little Bluestem Series (G3S2)
(*Pinus palustris*-*Schizachyrium scoparium*)
This upland, mainly evergreen woodland occurs in southeast Texas, primarily over loamy or sandy, low Ph soils. Loblolly and shortleaf pines (*Pinus taeda*, *P. echinata*) and species such as bluejack, blackjack, post, and southern red oaks (*Quercus incana*, *Q. marilandica*, *Q. stellata*, *Q. falcata*) and sweetgum (*Liquidambar styraciflua*) may occur in the overstory. The shrub layer may contain flowering dogwood (*Cornus florida*), American beautyberry (*Callicarpa americana*), wax-myrtle (*Myrica cerifera*), farkleberry (*Vaccinium arboreum*), and deerberry (*Vaccinium stamineum*). The well developed herbaceous layer contains grasses such as little bluestem (*Schizachyrium scoparium*), slender bluestem (*Schizachyrium tenerum*), pineywoods dropseed (*Sporobolus junceus*), Carolina jointtail (*Coelorachis cylindrica*), switchgrass (*Panicum virgatum*), *Panicum* spp., *Paspalum* spp., sedges (*Carex* spp., *Rhynchospora* spp., *Scleria* spp., *Fimbristylis* spp.), and yellow-eyed grass (*Xyris* spp.) To the south this type generally grades into the longleaf pine-beakrush series, on xeric sands into the bluejack oak-pine series, and on more mesic soils to pine-oak or American beech (*Fagus grandifolia*) dominated communities.

Marshhay Cordgrass Series (G4S4)
(*Spartina patens*)
This brackish marsh forms a discontinuous landward ring along the Gulf of Mexico. Saltgrass (*Distichlis spicata*), *Paspalum* spp., and bulrushes (*Scirpus* spp.) are common components. The type often forms landscape mosaics with saltgrass, smooth cordgrass (*Spartina alterniflora*), and gulf cordgrass (*Spartina spartinae*) marshes.

Mesquite-Granjeno Series (G5S5)
(*Prosopis glandulosa*-*Celtis pallida*)
This deciduous woodland occurs primarily in the South Texas Plains, and is related to disturbance woodlands throughout the western

Edwards Plateau and Rolling Plains. Important species include lotebush (Ziziphus obtusifolia), prickly pear (Opuntia spp.), brasil (Condalia hookeri), colima (Zanthoxylum fagara), catclaw acacia (Acacia greggii), huisache (Acacia smallii), and Acacia spp. Disturbance types similar to this include mesquite-juniper communities prominent on the western and central Edwards Plateau and on shallow-soiled slopes in the Rolling Plains, and mesquite-lotebush types common in the Rolling Plains. This type may grade into blackbrush (Acacia rigidula), guajillo (Acacia berlandieri), or Texas ebony (Pithecellobium flexicaule) woodlands or shrublands, or may form a mosaic with grasslands within the cane bluestem-false rhodesgrass (Bothriochloa barbinodis-Chloris pluriflora) series.

Mesquite-Huisache Series (G5S5)
(Prosopis glandulosa-Acacia smallii)
This deciduous woodland occurs over moderately to poorly drained soils, primarily in the South Texas Plains and the Coastal Prairie. It is a natural disturbance type of river floodplains and depressions that may succeed to sugarberry (Celtis laevigata) dominated forest, especially on floodplains of major streams. It is an even more widespread anthropogenic disturbance community type, with introduced species such as Chinese tallow tree (Sapium sebiferum) and Macartney rose (Rosa bracteata) associated on the upper coast and retama (Parkinsonia aculeata) on the South Texas Plains. In wet areas, huisache often forms nearly pure stands or occurs as scattered individuals within a matrix of weedy grasses during the course of secondary succession. This type may grade into blackbrush (Acacia rigidula) or guajillo (Acacia berlandieri) shrublands in south Texas and little bluestem (Schizachyrium scoparium) grasslands in the Coastal Prairie.

Mesquite-Saltbush Series (G4S4)
(Prosopis glandulosa-Atriplex spp.)
This broadly-defined shrubland community type occupies moderately saline, often sandy soils in the Trans-Pecos and South Texas Plains. Composition varies with geographic location, with wolfberry (Lycium berlandieri), lotebush (Ziziphus obtusifolia), Opuntia spp., and soaptree yucca (Yucca elata) are common shrubs, while in more saline areas there are fewer shrubs and grasses and forbs such as alkali sacaton (Sporobolus airoides), saltgrass (Distichlis spicata), and Sesuvium verrucosum are more common. This type may grade into alkali sacaton or tobosa (Hilaria mutica) grassland or may be surrounded by a matrix of desert shrubland.

Mesquite-Sandsage Series (G4S4)
(Prosopis glandulosa-Artemisia filifolia)
This deciduous shrubland is scattered over sandy soils in the Trans-Pecos. Creosotebush (Larrea tridentata), soaptree yucca (Yucca elata), broom dalea (Psorothamnus scoparius), Aristida spp., Sporobolus spp. and a variety of forbs such as Penstemon ambiguus, Heliotropium convolvulaceum, Abronia spp., Poliomintha spp., and Croton spp. are common components. Similar communities occur over

sandy soils in the Rolling and High Plains (see sandsage-midgrass series), and this type is often intermixed with xeromorphic shrubland types.

Mohr Shin Oak Series (G4S4)
(Quercus mohriana)
This widespread deciduous shrubland occurs primarily over shallow soils derived from limestone or caliche in the Trans-Pecos, Rolling Plains, and High Plains. Redberry juniper (Juniperus pinchotii), scrub oak (Quercus pungens), Quercus spp., and grasses including sideoats grama (Bouteloua curtipendula), Aristida spp., and Tridens spp. are common components. Where sandstone outcrops are exposed along the Caprock Escarpment, Havard shin oak (Quercus havardii) is a common component. Surrounding communities include midgrass grasslands.

Netleaf Hackberry-Little Walnut Series (G4S4)
(Celtis reticulata-Juglans microcarpa)
This deciduous woodland occurs on floodplains, primarily in the Trans-Pecos and western Edwards Plateau. Willow (Salix gooddingii, S. nigra), ash (Fraxinus spp.), Mexican buckeye (Ungnadia speciosa), Apache-plume (Fallugia paradoxa), sycamore (Platanus occidentalis), cottonwood (Populus spp.), and oaks (Quercus spp.), may be important. On more mesic sites this type grades into cottonwood-ash-willow communities or to the plateau live oak (Quercus fusiformis)-netleaf hackberry type, while on drier sites it may grade toward arroyo (Apache-plume series) shrublands.

New Mexico Little Bluestem Series (G4S3)
(Schizachyrium scoparium var. neomexicanum)
This midgrass grassland occurs at moderate to high elevations, usually over 5500 ft, in the Trans-Pecos. These mountain grasslands form landscape mosaics with the pinyon-oak (Pinus cembroides/P. edulis-Quercus spp.) or ponderosa pine (Pinus ponderosa) series woodland. Grass diversity is often high, and important species may include sideoats grama (Bouteloua curtipendula), blue grama (Bouteloua gracilis), bull muhly (Muhlenbergii emersleyi), cane bluestem (Bothriochloa barbinodis), woolspike balsamscale (Elyonurus barbiculmis), and Texas bluestem (Schizachyrium cirratum), depending on mountain range of occurrence, precipitation, and exposure. Drier grasslands are within the sideoats grama-black grama (Bouteloua curtipendula-Bouteloua eriopoda) series.

Oneseed Juniper Series (G4S4)
(Juniperus monosperma)
This evergreen shrubland occurs primarily in the northern Trans-Pecos and High Plains, usually over shallow soils and on slopes. Xeromorphic shrubs, oaks (Quercus pungens, Q. mohriana), feather dalea (Dalea formosa) and grasses such as black grama (Bouteloua eriopoda), sideoats grama (Bouteloua curtipendula), Sporobolus spp., Aristida spp., and Tridens spp. are often components. This

type is intermixed with midgrass grasslands on surrounding deeper-soiled flats.

Overcup Oak Series (G4S4)
(Quercus lyrata)
This deciduous forest inhabits frequently inundated floodplains of east Texas. Common components include red maple (Acer rubrum), water hickory (Carya aquatica), and willow oak (Quercus phellos). This type is usually intermixed with bottomland hardwood communities including baldcypress (Taxodium distichum) swamps, shrub swamps, and typical (drier) water oak (Quercus nigra) or willow oak dominated floodplain hardwoods.

Pecan-Sugarberry Series (G4S4)
(Carya illinoinensis-Celtis laevigata)
This deciduous forest or woodland occupies floodplains, primarily within the South Texas Plains, Edwards Plateau, and Blackland Prairie. It is best developed along major rivers, and soils are often heavy textured and calcareous. Important species may include netleaf hackberry (Celtis reticulata), cedar elm (Ulmus crassifolia), bur oak (Quercus macrocarpa),American elm (Ulmus americana), plateau live oak (Quercus fusiformis), black walnut (Juglans nigra), ash (Fraxinus spp.), Texas oak (Quercus buckleyi), and box-elder (Acer negundo). Drier floodplains of smaller streams may fall within the plateau live oak-hackberry series, while to the east more mesic floodplains support oak-dominated bottomland hardwood communities. Adjacent dry slopes may be Ashe juniper (Juniperus ashei) or Acacia spp. dominated in the Edwards Plateau and South Texas Plains.

Pickleweed-Seepweed Series (G4S4)
(Allenrolfea occidentalis-Suaeda spp.)
This herb dominated saline wetland occurs primarily in the Trans-Pecos, in alternately wet and dry habitats. The vegetation is open, and important species may include winged sesuvium (Sesuvium verrucosum), frankenia (Frankenia jamesia), saltgrass (Distichlis spicata), alkali sacaton (Sporobolus airoides), and fourwing saltbush (Atriplex canescens). This type may grade into saline grasslands within the alkali sacaton-fourwing saltbush series or saltgrass-olney bulrush (Scirpus olneyi) series, non-saline desert shrublands, or saline shrublands within the rough tiquilia (Tiquilia hispidissima) series. It may form landscape mosaics with these and other salt tolerant community types in saline marshes or gyp influenced habitats.

Pinyon Pine-Oak Series (G4S4)
(Pinus cembroides/ P. edulis-Quercus spp.)
This mainly evergreen woodland usually occupies moderate-elevation (5000-6500 ft) slopes of major mountain ranges in the Trans-Pecos. Gray oak (Quercus grisea), Mohr oak (Quercus mohriana), Emory oak (Quercus emoryi), alligator juniper (Juniperus deppeana), and redberry juniper (Juniperus pinchotii), plus species from semi-

desert and mountain grasslands, are common components. Junipers are more common on xeric sites whereas oaks are more important on mesic sites. Mexican pinyon pine (Pinus cembroides) occurs in the Davis and Chisos Mountains, Rocky Mountain pinyon pine (Pinus edulis) in the Guadalupe Mountains, and papershell pinyon pine (Pinus remota) at lower elevations in the Glass and Del Norte Mountains and eastward onto the Stockton and Edwards Plateau. At lower elevations this type grades into or interdigitates with the black grama-sideoats grama (Bouteloua eriopoda - B. curtipendula) series, and at higher elevations it interdigitates with the New Mexico little bluestem (Schizachyrium scoparium var. neomexicana) series. Conifer woodlands occupy higher elevations and oak woodlands sometimes occur on alluvial soils in mountain valleys adjacent to these pinyon-oak woodlands.

Plateau Live Oak-Midgrass Series (G3S3)
(Quercus fusiformis)
This mainly evergreen woodland occupies uplands of the Edwards Plateau, where it is often intermixed with midgrass grassland on flats and on gentle slopes. Composition varies with substrate (i.e. between the limestone derived soils of the Plateau proper and the generally sandier soils of the Llano Uplift) and precipitation. Canopy cover ranges from open to closed, with mottes of monoculture live oak present in some areas. Texas oak (Quercus buckleyi), cedar elm (Ulmus crassifolia), post oak (Quercus stellata), Ashe juniper (Juniperus ashei), scalybark oak (Quercus sinuata var. breviloba), Quercus spp., and shrubs such as Rhus spp. and Condalia spp. are variously present. Shallow soils or disturbed areas often support Ashe juniper or mesquite (Prosopis glandulosa) dominated woodlands or shrublands, while openings in good condition are mid-grass grasslands with species such as little bluestem (Schizachyrium scoparium), sideoats grama (Bouteloua curtipendula), and curlymesquite (Hilaria belangeri).

Plateau Live Oak-Netleaf Hackberry Series (G4S4)
(Quercus fusiformis-Celtis reticulata)
This evergreen to mainly deciduous woodland or forest occupies floodplains of streams, primarily within the Edwards Plateau, South Texas Plains, and eastern Trans-Pecos. Important species may include sugarberry (Celtis laevigata), pecan (Carya illinoinensis), ash (Fraxinus texana, F. berlandieri), cedar elm (Ulmus crassifolia), bur oak (Quercus macrocarpa), Ashe juniper (Juniperus ashei), and Texas persimmon (Diospyros texana). More mesic floodplains fall within the pecan-sugarberry or sugarberry-elm series. Adjacent slopes may be Ashe juniper or Acacia spp. dominated.

Ponderosa Pine Series (G4S3)
(Pinus ponderosa)
This evergreen woodland or forest is restricted to high elevations (over 6000 ft) in the Guadalupe, Davis, and Chisos Mountains in west Texas. Composition varies with elevation as well as mountain

range, with Gambel oak (Quercus gambelii), southwestern white pine (Pinus strobiformis), alligator juniper (Juniperus deppeana), gray oak (Quercus grisea), chinkapin oak (Quercus muhlenbergii), Chisos oak (Quercus gravesii), and Emory oak (Quercus emoryi) variously present. In the Chisos mountains, Pinus arizonica var. stormiae is a major component that occupies habitats similar to those with ponderosa pine to the north, and Arizona cypress (Cupressus arizonica) and weeping juniper (Juniperus flaccida) are also components. Open grasslands are interspersed throughout, and Arizona fescue (Festuca arizonica), New Mexico bluestem (Schizachyrium scoparium var. neomexicana), bulb panicum (Panicum bulbosum), needle grasses (Stipa pringlei, S. spp.), and Muhlenbergia spp. are common components. At lower elevations this type grades into evergreen pinyon pine-oak-juniper woodlands.

Post Oak-Black Hickory Series (G4S4)
(Quercus stellata-Carya texana)
This deciduous forest or woodland community type occurs primarily in east Texas and the Post Oak Savannah, usually on sandy or loamy upland soils. The woody plant diversity is highest to the east, where this type forms closed canopy forest, while herbaceous species diversity increases to the west where the type forms open woodlands over deep sands. Composition varies with location and soil texture and depth. White oak (Quercus alba), southern red oak (Quercus falcata), blackjack oak (Quercus marilandica), Pinus spp., Carya spp., flowering dogwood (Cornus florida), yaupon (Ilex vomitoria), and American beautyberry (Callicarpa americana) are common components. Drier habitats over deep sands in east Texas fall within the bluejack oak (Quercus incana)-pine series, and this type may grade into various hardwood, oak, or oak-pine types.

Post Oak-Blackjack Oak Series (G4S4)
(Quercus stellata-Quercus marilandica)
This deciduous woodland or forest occurs in east and east central Texas, including the Pineywoods, Post Oak Savannah, and Cross-Timbers. Composition of this broadly defined community type varies with geographic region and soils, with open woodlands occurring to the west or over drier soils and closed forests occurring to the east or over mesic soils. Cedar elm (Ulmus crassifolia), southern red oak (Quercus falcata), yaupon (Ilex vomitoria), American beautyberry (Callicarpa americana), water oak (Quercus stellata), black hickory (Carya texana), redbud (Cercis canadensis), and deciduous holly (Ilex decidua) are variously important. Eastern redcedar (Juniperus virginiana) is a common invader. Open woodlands often contain components of tallgrass grasslands in the herbaceous layer, and this type may intergrade with the post oak-black hickory or bluejack oak-pine (Quercus incana-Pinus spp.) series.

Redberry Juniper-Midgrass Series (G4S4)
(Juniperus pinchotii)
This evergreen woodland or shrubland occurs on slopes, often over

gypsum- or caliche-influenced soils, primarily in the Rolling Plains and Trans-Pecos. Lotebush (Ziziphus obtusifolia), mesquite (Prosopis glandulosa), oaks (Quercus mohriana, Q. pungens, Q. havardii), feather dalea (Dalea formosa), Yucca spp., and grasses such as blue grama (Bouteloua gracilis), sideoats grama (Bouteloua curtipendula), Tridens spp., Sporobolus spp., and curlymesquite (Hilaria mutica) are common components. This community type is often within a matrix of midgrass-mesquite grassland.

Rocky Mountain Juniper Series (G4S2)
(Juniperus scopulorum)
This evergreen woodland is isolated on mesic slopes and in canyons along the Caprock Escarpment. Rocky Mountain juniper forms nearly pure stands, while surrounding drier slopes are more open redberry juniper (Juniperus pinchotii)-midgrass communities.

Rough Tiquilia Series (G4S4)
(Tiquilia hispidissima)
This mainly deciduous or semi-evergreen dwarf desert shrubland is isolated on gypsum-influenced soils of the Trans-Pecos. Substrate ranges from windblown gypsum dunes to nearly bare gyp deposits, and composition varies accordingly. Torrey yucca (Yucca torreyi), gypgrass (Sporobolus nealleyi), chino grama (Bouteloua breviseta), Indian blanket (Gaillardia multiceps), moonpod (Selinocarpus spp.), gyp ringstem (Anulocaulis gypsogenus), and cactus species are common components. This type is often isolated within a matrix of xeromorphic shrubland, and may form landscape mosaics with other gyp tolerant community types in alternately wet and dry habitats.

Rush-Sedge Series (G4S3)
(Juncus spp.)
This broadly defined marsh community type is scattered across the state, but is most common along the Gulf coast and in east Texas. A variety of grasses, sedges, rushes and aquatic plants may be important. Along the Gulf coast, this type often grades into brackish marsh.

Saltgrass-Cordgrass Series (G4S4)
(Distichlis spicata-Spartina spp.)
This salt or brackish marsh community occurs along the Gulf coast. Saltgrass often forms nearly pure stands, but smooth cordgrass (Spartina alterniflora), marshhay cordgrass (Spartina patens), Paspalum spp., Sporobolus spp., and Eragrostis spp. may be present. This type forms landscape mosaics with coastal cordgrass marshes and saline herblands along the Gulf Coast.

Saltgrass-Olney Bulrush Series (G3S2)
(Distichlis spicata-Scirpus olneyi)
This marsh or wet shortgrass community type is associated with perennial seeps in the Trans-Pecos. Saltgrass sometimes forms nearly pure stands on slightly elevated sites, while Olney bulrush occupies adjacent wetter areas. Other important species may

include alkali sacaton (Sporobolus airoides), big sacaton (Sporobolus wrightii), alkali muhly (Muhlenbergia asperifolia), and fourwing saltbush (Atriplex canescens). This type sometimes forms landscape mosaics with the pickleweed-seepweed (Allenrolfea occidentalis-Suaeda spp.) and the alkali sacaton-fourwing saltbush series in response to various depths and duration of flooding and salinity. A narrow band of mesquite (Prosopis glandulosa) may form an outer ring, while surrounding uplands are desert shrublands.

Sandsage-Midgrass Series (G4S4)
(Artemisia filifolia)
This evergreen shrubland or midgrass grassland occurs over sandy soils in the Rolling and High Plains. Composition varies with precipitation, disturbance, and soil texture, with mid-grasses common on good quality rangeland. Mesquite (Prosopis glandulosa) may also be a component (see mesquite-sandsage series). Important grasses include little bluestem (Schizachyrium scoparium), sand dropseed (Sporobolus cryptandrus), prairie sandreed (Calamovilfa gigantea), Aristida spp., Bouteloua spp., and Eragrostis spp. This type is related to other sandy-soil types, including the Havard shin oak-tallgrass (Quercus havardii) and mesquite-sandsage series. It occurs within a matrix of mid-and shortgrass community types.

Scrub Oak-Mountain Mahogany Series (G4S4)
(Quercus pungens-Cercocarpus montanus)
This mainly evergreen shrubland is restricted to mid-elevation areas (4500-5500 ft) in the mountains of the Trans-Pecos, and occupies slopes that are pinyon-oak-juniper communities further north. Important shrubs include Rhus spp., Gregg ash (Fraxinus greggii), desert ceanothus (Ceanothus greggii), oaks (Quercus mohriana, Q. turbinella), mountain laurel (Sophora secundiflora), fendlerbush (Fendlera rupicola), greasebush (Forsellesia spp.), and silktassel (Garrya ovata, G. wrightii). This type is intermixed with succulent desert shrubland and semi-desert grassland.

Seacoast Bluestem-Gulfdune Paspalum Series (G4S3)
(Schizachyrium scoparium var. littoralis-Paspalum monostachyum)
This tall to midgrass community type occupies stabilized secondary dunes and vegetated flats on barrier islands and is the predominant grassland of the Coastal Sand Plain. On the Coastal Sand Plain, live oak mottes (see coastal live oak-sugarberry series) or rather extensive woodlands are intermixed with open grasslands, often with scattered mesquite (Prosopis glandulosa). tanglehead (Heteropogon contortus), brownseed paspalum (Paspalum plicatulum), Silveusgrass (Trichoneura elegans), Dichanthelium spp., and Pan-American balsamscale (Elyonurus barbiculmis) are common components. Minor changes in drainage cause shifts in compositions, and poorly drained inclusions may support Gulf cordgrass (Spartina spartinae) or fresh marsh. Sporobolus spp., Eragrostis spp., and sedges (Carex spp., Scirpus spp., Fuirena spp., Fimbristylis spp.) are important on barrier islands, where this type grades into the Sea

Oats-Bitter Panicum (Uniola paniculata-Panicum amarum) series on drier, less stable dunes.

Sea Oats-Bitter Panicum Series (G4S3)
(Uniola paniculata-Panicum amarum)
This mid to tallgrass community occupies excessively drained sands on partially stabilized dunes of the coastal barrier islands and patches of mainland Gulf shoreline. Sea oats (Uniola paniculata) is the most important component, but is replaced along the Upper Coast by bitter panicum (Panicum amarum). Trailing succulent perennial forbs such as beach purslane (Sesuvium portulacastrum), goatfoot morning-glory (Ipomaea pes-caprae), and fiddleleaf morning-glory (Ipomaea stolonifera) usually dominate the gulfward face of the dunes. At the foot of the landward side of the dune this community grades abruptly into seacoast bluestem-gulfdune paspalum (Schizachyrium scoparium var. littoralis-Paspalum monostachyum) dominated grasslands of wetter soils on barrier island flats.

Shortleaf Pine-Oak Series (G4S4)
(Pinus echinata-Quercus spp.)
This mainly deciduous upland woodland occupies shallow to deep, usually sandy soils, primarily in northeast Texas. Composition varies with soils and exposure, with pines more common on shallow, dry soils or in disturbed habitats. Important oaks include post, blackjack, southern red, black, and white (Quercus stellata, Q. marilandica, Q. falcata, Q. velutina, Q. alba), depending on soil water relations, and loblolly pine (Pinus taeda) and Carya spp. may also be important. This type grades into oak-hickory forest on more mesic sites in the north, and often interdigitates with oak-loblolly pine types in central east Texas.

Sideoats Grama Series (G3S3)
(Bouteloua curtipendula)
This broadly defined midgrass grassland is characteristic of uplands over relatively deep soils in the Rolling Plains and also occurs in the central and western Edwards Plateau. Shrubs such as lotebush (Ziziphus obtusifolia), juniper (Juniperus pinchotii, J. ashei), Opuntia spp., and mesquite (Prosopis glandulosa) are components that increase under grazing pressure. Important grasses include blue grama (Bouteloua gracilis), Texas wintergrass (Stipa leucotricha), curlymesquite (Hilaria belangeri), slim tridens (Tridens muticus), Aristida spp., cane bluestem (Bothriochloa barbinodis), vine-mesquite (Panicum obtusum), little bluestem (Schizachyrium scoparium), Indiangrass (Sorghastrum nutans), and California cottontop (Digitaria californica). In the Rolling Plains, this type is intermixed with Pinchot (redberry) juniper shrubland over steep, xeric soils, and adjacent sandy soils support midgrass grasslands within the sandsage (Artemisia filifolia)-midgrass series. In the Edwards Plateau, this type forms mosaics with plateau live oak (Quercus fusiformis) and Ashe juniper

(Juniperus ashei) woodlands, and to the west or over dry soils grades into the curlymesquite-sideoats grama series.

Sideoats Grama-Black Grama Series (G4S3)
(Bouteloua curtipendula-B. eriopoda)
This midgrass-dominated semi-desert grassland inhabits moderate elevations (3500-5200 ft) of the Trans-Pecos mountains and plateaus. Composition varies with abiotic factors and grazing history, with black grama (Bouteloua eriopoda) often dominant on rocky slopes and blue grama (B. gracilis) dominant on deeper soils. Other important grasses include sideoats grama (B. curtipendula), Tridens spp., Bothriochloa spp., and three awns (Aristida spp.). Annual grasses and shrubs and succulents such as cane cholla (Opuntia imbricata), mesquite (Prosopis glandulosa), soaptree yucca (Yucca elata), spanish dagger (Yucca treculeana), and javelina bush (Condalia ericoides) increase under grazing pressure. This community type is intermixed with or grades into pinyon-oak-juniper woodlands at higher elevations or succulent desert shrubland (lechuguilla-sotol series, Agave lechuguilla-Dasylirion leiophyllum) on dry slopes.

Silveanus Dropseed Series (G2S2)
(Sporobolus silveanus)
This tallgrass community type occupies loamy, low Ph upland soils in the northeastern Blackland Prairie. Important species include sedges (Carex meadii, Fimbristylis puberula, Scleria spp.), longspike tridens (Tridens strictus), Indiangrass (Sorghastrum nutans), switchgrass (Panicum virgatum), and eastern gamagrass (Tripsacum dactyloides) along with a diversity of forbs. On clayey soils in this region relict communities are dominated by gamagrass and switchgrass.

Smooth Cordgrass Series (G4S4)
(Spartina alterniflora)
This salt marsh is restricted to areas along the Gulf coast that are subject to the daily ebb and flow of tides. Juncus roemerianus, saltgrass (Distichlis spicata), Juncus spp., big cordgrass (east) (Spartina cynosuroides), and marshhay cordgrass (Spartina patens) may be components. This community grades into brackish marsh landward and forms landscape mosaics with other cordgrass and saltgrass marshes.

Spanish Bayonet Series (G4S3)
(Yucca faxoniana)
This xeromorphic desert shrubland occupies mid-elevation (3500-5000 ft) slopes in the southern Trans-Pecos, especially the Dead Horse Mountains. Spanish bayonet (giant dagger) is the visual dominant, but grasses such as black and chino grama (Bouteloua eriopoda, B. breviseta) and succulent shrubs such as lechuguilla (Agave lechuguilla) and chaparral-like species (Quercus pungens, Rhus virens, Rhus microphylla, Cercocarpus montanus, Ceanothus greggii) are also important. This community type usually occurs at lower

elevations or on more xeric sites than the scrub oak-mountain mahogany (Quercus pungens-Cercocarpus montanus) series.

Sphagnum-Beakrush Series (G4S2)
(Sphagnum spp.-Rhynchospora spp.)
This graminoid-dominated community type includes various types of seepage bogs which occur primarily in east Texas. Sphagnum mosses may or may not be abundant, and beakrushes (Rhynchospora oligantha, R. gracilenta, R. spp.) along with yellow-eyed grass (Xyris scabrifolia, Xyris spp.), nutrush (Scleria reticularis), and grasses (Schizachyrium spp., Dichanthelium spp., Panicum spp.), pitcher plant (Sarracenia alata), and sedges may be dominant. Occurrences of this community type are usually small and isolated within a matrix of upland pine or pine-oak forest, and the herbaceous flora is diverse with numerous restricted species. Small trees, shrubs, and vines such as sweetbay magnolia (Magnolia virginiana), evergreen bayberry (Myrica heterophylla), and laurel greenbriar (Smilax laurifolia) invade many bogs in the absence of fire. Surrounding uplands often occur over a sandy substrate on which open oak or pine woodlands are common.

Sugarberry-Elm Series (G4S4)
(Celtis laevigata-Ulmus spp.)
This broadly defined deciduous forest occurs on floodplains and mesic slopes, primarily in central and south Texas. American elm (Ulmus americana) is common on wetter sites, while cedar elm (Ulmus crassifolia) increases to the west and south. Composition varies with flooding regime and geographic location. Pecan (Carya illinoinensis), ash (Fraxinus berlandieri, F. pensylvanica, F. texensis), oaks (Quercus muhlenbergii, Q. buckleyi, Q. macrocarpa), and sycamore (Platanus occidentalis) are variously important, but geographic differences are poorly documented. The plateau live oak-netleaf hackberry (Quercus fusiformis-Celtis reticulata) and pecan-sugarberry series are defined for the Edwards Plateau, South Texas Plains, and Blackland Prairie. Sugarberry or netleaf hackberry and cedar elm dominated communities are a widespread and common disturbance type of uplands and floodplains of central and south Texas. To the east this type grades into typical bottomland hardwoods communities within the water oak-willow oak (Quercus nigra-Q. phellos) series.

Swamp Chestnut Oak-Willow Oak Series (G3S3)
(Quercus michauxii-Quercus phellos)
This deciduous bottomland forest occurs on interdistributary flats in southeast Texas. Sweetgum (Liquidambar styraciflua), overcup oak (Quercus lyrata), and cherrybark oak (Quercus falcata var. pagodifolia) are often important, and dwarf palmetto (Sabal minor) is common in the understory. This type is closely related to the typical water oak (Quercus nigra)-willow oak series of floodplains, but lacks water oak as an important species.

Sweetbay Magnolia Series (G4S4)
(Magnolia virginiana)
This mainly evergreen to mainly low forest occurs over seeps, in wet creek bottoms, and in other permanently moist soils in east Texas. There is considerable north to south variation which has not been well documented. Gallberry holly (Ilex coriacea), black titi (Cyrilla racemiflora), wax-myrtle (Myrica heterophylla), red maple (Acer rubrum), buttonbush (Cephalanthus occidentalis), swamp gum (Nyssa biflora), laurel greenbriar (Smilax laurifolia), possumhaw viburnum (Viburnum nudum), and maleberry (Lyonia *ligustrina) may be components, depending on geographic location and soil reaction. This type is often associated with the sphagnum-beakrush series (bogs), and may be successional to bogs in the absence of fire.

Sycamore-Willow Series (G5S5)
(Platanus occidentalis-Salix nigra)
This broadly defined mostly deciduous strip forest or woodland occupies moist to wet often gravelly soils in periodically scoured creek and river beds across most of the Edwards Plateau and adjacent areas. Sycamore, black willow, and eastern cottonwood (Populus deltoides) are usually present, often as scattered small trees representing growth since the most recent catastrophic flood. A poorly developed shrub layer composed of willow baccharis (Baccharis neglecta), buttonbush (Cephalanthus occidentalis), creek indigo (Amorpha fruticosa) and/or little walnut (Juglans microcarpa) may be present, along with a ground layer that varies widely depending on moisture, stratum, disturbance and other factors.

Texas Ebony-Anacua Series (G2S1)
(Pithecellobium flexicaule-Ehretia anacua)
This evergreen subtropical forest occurs primarily on well-drained but moist river or resaca terraces in the lower Rio Grande valley. Snake-eyes (Phaulothamnus spinescens), coma (Bumelia celastrina), tenaza (Pithecellobium pallens), tepeguaje (Leucaena pulverulenta), colima (Zanthoxylum fagara), brasil (Condalia hookeri), granjeno (Celtis pallida), lotebush (Ziziphus obtusifolia), and mesquite (Prosopis glandulosa) may be important. This type is similar to subtropical shrubland (Texas ebony-snake-eyes series), which occupies drier sites.

Texas Ebony-Snake-eyes Series (G2S2)
(Pithecellobium ebano-Phaulothamnus spinescens)
This subtropical evergreen shrubland or low forest occurs primarily over heavy soils in the lower Rio Grande valley. There is considerable variation with soil type and location, and shrublands on lomas in South Bay are also included as a variant of this series. Coma (Bumelia celastrina), brasil (Condalia hookeri), lotebush (Ziziphus obtusifolia), colima (Zanthoxylum fagara), mesquite (Prosopis glandulosa), and granjeno (Celtis pallida) may be important. This type is closely related to taller Texas ebony-

anacua forests on wetter sites, but contains a greater compliment of xeromorphic shrubs. It grades into non-subtropical shrublands to the north and west.

Texas Oak Series (G3S3)
(Quercus buckleyi)
This mainly deciduous woodland or forest occurs primarily on mesic slopes over calcareous soils of the eastern and southern Edwards Plateau and Lampasas Cut Plain. Cedar elm (Ulmus crassifolia), sugarberry (Celtis laevigata), netleaf hackberry (Celtis reticulata), plateau live oak (Quercus fusiformis), chinkapin oak (Q. muhlenbergii), scalybark oak (Q. sinuata var. breviloba), Ashe juniper (Juniperus ashei), black cherry (Prunus serotina subsp. eximia), and Texas ash (Fraxinus texensis) are variously important. Plateau live oak woodlands or mixed grasslands occupy adjacent deep upland soils, while Ashe juniper woodlands occupy drier slopes. Adjacent floodplains are sugarberry, elm, pecan, or live oak dominated. In a relatively small portion of the south central Edwards Plateau, similar sites may support the Lacey oak (Quercus laceyi) series, and to the east scalybark oak is locally dominant.

Texas Palmetto Series (G2S1)
(Sabal mexicana)
This evergreen subtropical woodland or forest is limited to a few sites along the Rio Grande south of Brownsville, although populations of palm are known from as far north as Victoria County. It was probably never widespread in Texas, and may be dependent on frequent flooding and fire. Texas ebony (Pithecellobium ebano), brasil (Condalia hookeri), cedar elm (Ulmus crassifolia), anacua (Ehretia anacua), tenaza (Pithecellobium pallens), tepeguaje (Leucaena pulverulenta), and coma (Bumelia celastrina) are present. This type is closely related to the Texas ebony-anacua series.

Tobosa Series (G4S4)
(Hilaria mutica)
This shortgrass grassland usually occurs over heavy soils on flats within the Trans-Pecos, southwestern Rolling Plains and northwestern Edwards Plateau. These grasslands sometimes occupy sites that receive excess runoff from the surrounding landscape and hence represent small, internally drained basin bottoms. Mesquite (Prosopis glandulosa) may be scattered throughout, and common grasses include buffalograss (Buchloe dactyloides), vine-mesquite (Panicum obtusum), California cottontop (Digitaria californica), Bouteloua spp., Tridens spp., and Sporobolus spp. This series occurs within a matrix of a variety of shrublands and mixed grasslands, with saline areas sometimes grading toward alkali sacaton (Sporobolus airoides) dominated grassland.

Velvet Ash-Willow Series (G3S2)
(Fraxinus velutina-Salix spp.)
This deciduous woodland occurs in mesic canyons and along floodplains in the Trans-Pecos. Composition varies with soil

moisture and flooding regime, and western soapberry (Sapindus drummondii), netleaf hackberry (Celtis reticulata), Fremont cottonwood (Populus fremontii), Mexican buckeye (Ungnadia speciosa), mesquite (Prosopis glandulosa), little walnut (Juglans microcarpa), and scrub oak (Quercus pungens) are variously present. This type is closely related with the cottonwood-willow series, which once occupied floodplains of larger rivers in the region.

Viscid Acacia Series (G4S4)
(Acacia neovernicosa)
This xeromorphic shrubland occurs primarily at low to moderate (below 4000 ft) elevations, often on slopes, in the Chihuahuan Desert region. Viscid acacia is closely related to, and probably hybridizes with, mescat acacia (Acacia constricta) and Schott acacia (Acacia schottii). The three species occupy similar habitats, although mescat acacia is most common along the Rio Grande in gravelly soils, and Schott acacia is most common on gypseous soils. All of the species are referred to as whitethorn acacia. Creosotebush (Larrea tridentata), mariola (Parthenium incanum), mesquite (Prosopis glandulosa), tarbush (Flourensia cernua), tobosa (Hilaria mutica), Sporobolus spp., and Bouteloua spp. may be important. This type is intermixed with other xeromorphic shrublands.

Water Elm-Swamp Privet Series (G4S4)
(Planera aquatica-Forestiera acuminata)
This mainly deciduous shrub swamp inhabits frequently flooded areas in southeast Texas. Buttonbush (Cephalanthus occidentalis), black willow (Salix nigra), ash (Fraxinus caroliniana, F. pensylvanica), smooth alder (Alnus serrulata), water hickory (Carya aquatica), hehuckleberry (Lyonia ligustrina), and baldcypress (Taxodium distichum) may be present, depending on flooding regime and geographic location. This type often intergrades with baldcypress swamp, bottomland hardwood, and fresh marsh communities, and is replaced by the buttonbush series to the north and west where many components with southeastern affinities are not present.

Water Oak-Coastal Live Oak Series (G3S3)
(Quercus nigra-Quercus virginiana)
This mainly deciduous woodland occurs on floodplains and along bayous in the Upper Coastal Prairie. Pecan (Carya illinoinensis), cedar elm (Ulmus crassifolia), sugarberry (Celtis laevigata), yaupon (Ilex vomitoria), Crataegus spp., and deciduous holly (Ilex decidua) may be present. This type is similar to water oak and willow oak (Quercus phellos) dominated bottomlands to the east. It may occur in the landscape with coastal live oak-pecan or post oak (Quercus stellata)-coastal live oak upland forests and little bluestem grasslands.

Water Oak-Willow Oak Series (G4S3)
(Quercus nigra-Quercus phellos)
This broadly defined deciduous bottomland hardwood forest occupies

often-inundated floodplains of major streams in east Texas. Composition varies with minor changes in elevation and with geographic location. Common components include sweetgum (Liquidambar styraciflua), cherrybark oak (Quercus falcata var. pagodifolia), ash (Fraxinus spp.), and overcup oak (Quercus lyrata) in the overstory and ironwood (Carpinus caroliniana), eastern hop-hornbeam (Ostrya virginiana), deciduous holly (Ilex decidua), and Florida maple (Acer saccharum var. floridana) in the understory. Swamps and marshes are often intermixed, and surrounding uplands are usually oak-hickory or oak-pine types.

GLOBAL RANK (GRANK)

G1 - Critically imperiled globally, extremely rare, 5 or fewer occurrences. [Critically endangered throughout range.]
G2 - Imperiled globally, very rare, 6 to 20 occurrences. [Endangered throughout range.]
G3 - Very rare and local throughout range or found locally in restricted range, 21 to 100 occurrences. [Threatened throughout range.]
G4 - Apparently secure globally.
G5 - Demonstrably secure globally.
GH - Of historical occurrence through its range.
G#NA - Accidental in North America.
G#NE - An exotic species established in North America.
G#T# - "G"= species rank; "T"= rank of variety or subspecies taxa.
GU - Possibly in peril range-wide, but status uncertain.
G#G# - Ranked within a range as status uncertain.
GX - Believed to be extinct throughout range.
Q - Qualifier denoting questionable taxonomic assignment.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

STATE RANK (SRANK)

S1 - Critically imperiled in state, extremely rare, very vulnerable to extirpation, 5 or fewer occurrences.
S2 - Imperiled in state, very rare, vulnerable to extirpation, 6 to 20 occurrences.
S3 - Rare or uncommon in state, 21 to 100 occurrences.
S4 - Apparently secure in state.
S5 - Demonstrably secure in state.
SA - Accidental in state.
SE - An exotic species established in state.
SH - Of historical occurrence in state. May be rediscovered.
SN - Regularly occurring, non-breeding status.
SP - Potential occurrence in state.
SR - Reported, but without persuasive documentation.
SRF - Reported in error, but error persists in literature.
SU - Possibly in peril in state, but status uncertain.
SX - Apparently extirpated from State.
SZ - Migratory/transient in state to irregular/dispersed locations.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

TEXAS PARKS AND WILDLIFE

Wildlife Habitat Assessment Program
Threatened and Endangered Species Review
3000 S. IH-35, Suite 100
Austin, Texas 78704
512/912-7011 phone
512/912-7058 fax
www.tpwd.state.tx.us

Threatened and Endangered Species Review

This service includes an analysis of your site-specific assessment of environmental information and impacts on threatened, endangered, and other rare species, natural communities, and special features presently known and/or potentially occurring in the vicinity of a project. Please complete this form, attach a write-up for Numbers 1 through 8 listed below, and send this information to us at the above address. We will provide you an analysis and/or recommendations based on the most current information available to Texas Parks and Wildlife regarding these sensitive natural resources. Please allow up to 8 weeks for review, depending on the size of your request. Note that the more information you provide, the more customized our review, and the faster our turnaround. If you need only **state or county level information** for preliminary project planning, in lieu of this form please contact our administrative staff at (512) 912-7011.

NAME	DATE
COMPANY	PHONE
ADDRESS	FAX
Project Title:	County(ies):

1) Scope of Project – Why is the review being requested?
   a) What regulations will this review help you to comply with?
   b) What activities will be conducted at the site?

2) Vegetation - structure and composition, vegetation layers, height of layers, dominant species

3) Other Natural Resources/Physical features - watercourses, soils, geology, animals, etc.

4) Improvements - extent of pavement, gravel, shell, or other cover; buildings, landscaped, xeriscaped, drainage system, etc).

- Threatened and Endangered Species Review, contd. -

5) Historic Use of Site - Describe in detail.

6) Has a T & E survey already been performed? If Yes, provide surveyor name, qualifications, survey method; acreage surveyed; level of effort; weather conditions, time of day, and dates the survey was performed.

7) Description of potential negative impacts from project activities and avoidance, minimization, and mitigation measures planned. Describe briefly.

8) Description of planned beneficial enhancements or restoration efforts. Describe briefly.

9) Original(s) or photocopy(ies) of relevant portion(s) of USGS 7.5′ topographic quadrangle(s) or best map(s) available.

10) Original(s) or color-copied photograph(s), or aerial photograph(s).

TPWD would like to inform you that due to the increase in requests for **threatened and endangered species review** of proposed projects, charges have been instituted for this service. Since TPWD is largely a self-funded agency, this revenue will allow for additional staffing to provide more timely responses to review requests. The charges are based on a flat fee (minimum charge of $50/project site), except when the project is unusually large ($25/additional hour). The response letter for these projects will be provided within 8 weeks, longer for large projects, and accompanied by an invoice, which will be due upon receipt. Government agencies are exempted from these charges. Private consultants performing work under contract for government entities will be charged.

TEXAS PARKS & WILDLIFE

Notes for County Lists of Texas' Special Species

TEXAS PARKS & WILDLIFE

The Texas Parks and Wildlife (TPWD) county lists **include**:

Vertebrates, Invertebrates, and Vascular Plants on the special species lists of the Texas Biological and Conservation Data System. These special species lists are comprised of all species, subspecies, and varieties that are federally listed; proposed to be federally listed; have federal candidate status; are state listed; or carry a global conservation status indicating a species is imperiled, very rare, or vulnerable to extirpation.

Colonial Waterbird Nesting Areas and Migratory Songbird Fallout Areas are contained on the county lists for coastal counties only.

The TPWD county lists **exclude**:

Natural Plant Communities such as Little Bluestem-Indiangrass Series (native prairie remnant), Water Oak-Willow Oak Series (bottomland hardwood community), Saltgrass-Cordgrass Series (salt or brackish marsh), Sphagnum-Beakrush Series (seepage bog).

Other Significant Features such as non-coastal bird rookeries, migratory bird information, bat roosts, bat caves, invertebrate caves, and prairie dog towns.

The **revised date** on each county list reflects the last date any changes or revisions were made for that county and reflects current listing statuses and taxonomy.

Species that appear on county lists do not all share the same probability of occurrence within a county. Some species are migrants or wintering residents only. Additionally, a few species may be historic or considered extirpated within a county. Species considered extirpated within the state are so flagged on each list.

Revised: 12/5/01

TEXAS PARKS & WILDLIFE

The Texas Biological and Conservation Data System

TEXAS PARKS & WILDLIFE

The Texas Biological and Conservation Data System (TXBCD), established in 1983, is the Department's most comprehensive source of information on rare, threatened, and endangered plants and animals, exemplary natural communities, and other significant features. Though it is not all-inclusive, the TXBCD is constantly updated, providing current or additional information on statewide status and locations of these unique elements of natural diversity.

The TXBCD gathers biological information from museum and herbarium collection records, publications, experts in the scientific community, organizations, individuals, and on-site field surveys conducted by TPWD staff on public lands or private lands with written permission. TPWD staff botanists, zoologists, and ecologists perform field surveys to locate and verify specific occurrences of high-priority biological elements and collect accurate information on their condition, quality, and management needs.

The TXBCD can be used to help evaluate the environmental impacts of routing and siting options for development projects. It also assists in impact assessment, environmental review, and permit review.

Given the small proportion of public versus private land in Texas, the TXBCD does not include a representative inventory of rare resources in the state. Although it is based on the best data available to TPWD regarding rare species, these data cannot provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features in any area. Nor can these data substitute for on-site evaluation by qualified biologists. The TXBCD information is intended to assist the user in avoiding harm to species that may occur.

Please use the following citation to credit the TXBCD as the source for this county level information:

> Texas Biological and Conservation Data System. Texas Parks and Wildlife, Wildlife Diversity Branch. County Lists of Texas' Special Species. [county name(s) and revised date(s)].

For information on obtaining a project review form or a site-specific review of a project area for rare species, please call (512) 912-7011.

Revised: 12/5/01

TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
BREWSTER COUNTY

Revised: 98-05-01

Scientific Name	Common Name	Federal Status	State Status
*** BIRDS			
BUTEO ALBICAUDATUS	WHITE-TAILED HAWK		T
BUTEO ALBONOTATUS	ZONE-TAILED HAWK		T
BUTEO NITIDUS	GRAY HAWK		T
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK		T
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	~~C1~~ PT	
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	E
FALCO PEREGRINUS	PEREGRINE FALCON	~~E/SA~~ DL	E, T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
VIREO ATRICAPILLUS	BLACK-CAPPED VIREO	LE	E
*** FISHES			
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER		T
CYCLEPTUS ELONGATUS	BLUE SUCKER		T
CYPRINODON EXIMIUS	CONCHOS PUPFISH		T
GAMBUSIA GAIGEI	BIG BEND GAMBUSIA	LE	E
NOTROPIS CHIHUAHUA	CHIHUAHUA SHINER		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER		
*** INSECTS			
AMPLYPTERUS BLANCHARDI	BLANCHARDS' SPHINX MOTH		
DERONECTES NEOMEXICANA	BONITA DIVING BEETLE		
*** MAMMALS			
CANIS LUPUS (extirpated)	GRAY WOLF	LE	E
CYNOMYS LUDOVICIANUS ~~ARIZONENSIS~~	~~ARIZONA~~ BLACK-TAILED PRAIRIE DOG	C	
EUDERMA MACULATUM	SPOTTED BAT		T
EUMOPS PEROTIS CALIFORNICUS	GREATER WESTERN MASTIFF BAT		
FELIS PARDALIS	OCELOT	LE	E
LEPTONYCTERIS NIVALIS	GREATER LONG-NOSED BAT	LE	E
MYOTIS THYSANODES	FRINGED MYOTIS BAT		
MYOTIS VELIFER	CAVE MYOTIS BAT		
MYOTIS VOLANS	LONG-LEGGED MYOTIS BAT		
MYOTIS YUMANENSIS	YUMA MYOTIS BAT		
NASUA NARICA	WHITE-NOSED COATI		T
SIGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT		
SYLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL		
URSUS AMERICANUS	BLACK BEAR	~~T/SA~~	T
*** MOLLUSKS			
HUMBOLDTIANA CHISOSENSIS	CHISOS MOUNTAINS THREEBAND		
HUMBOLDTIANA TEXANA	STOCKTON PLATEAU THREEBAND		
*** REPTILES			
COLEONYX RETICULATUS	RETICULATED GECKO		T
GOPHERUS BERLANDIERI	TEXAS TORTOISE		T

KINOSTERNON HIRTIPES	CHIHUAHUAN MUD TURTLE		T
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE		T
TRACHEMYS GAIGEAE	BIG BEND SLIDER		
TRIMORPHODON BISCUTATUS	TEXAS LYRE SNAKE		T
*** VASCULAR PLANTS			
ACLEISANTHES WRIGHTII	WRIGHT'S TRUMPETS		
AGALINIS CALYCINA	LEONCITA FALSE FOXGLOVE		
AGAVE GLOMERULIFLORA	CHISOS AGAVE		
ALLOLEPIS TEXANA	TEXAS FALSE SALTGRASS		
ANDRACHNE ARIDA	TRANS-PECOS MAIDENBUSH		
BATESIMALVA VIOLACEA	PURPLE GAY-MALLOW		
BONAMIA OVALIFOLIA	BIGPOD BONAMIA		
BOUTELOUA KAYI	KAY'S GRAMA		
BRICKELLIA BRACHYPHYLLA VAR HINCKLEYI	HINCKLEY'S BRICKELLBUSH		
BRICKELLIA BRACHYPHYLLA VAR TERLINGUENSIS	TERLINGUA BRICKELLBUSH		
BRONGNIARTIA MINUTIFOLIA	LITTLE-LEAF BRONGNIARTIA		
CARDAMINE MACROCARPA VAR TEXANA	TEXAS LARGESEED BITTERCRESS		
CASTILLEJA ELONGATA	TALL PAINTBRUSH	~~G1~~	
CEREUS GREGGII VAR GREGGII	DESERT NIGHT-BLOOMING CEREUS		
CHAMAESYCE CHAETOCALYX VAR TRILIGULATA	THREE-TONGUE SPURGE		
CHAMAESYCE GOLONDRINA	SWALLOW SPURGE		
CHAMAESYCE JEJUNA	DWARF BROOMSPURGE		
CORYPHANTHA ALBICOLUMNARIA	WHITE COLUMN CACTUS		
CORYPHANTHA DASYACANTHA VAR DASYACANTHA	DENSE CORY CACTUS		
CORYPHANTHA DUNCANII	DUNCAN'S CORY CACTUS		
CORYPHANTHA HESTERI	HESTER'S CORY CACTUS		
CORYPHANTHA MINIMA	NELLIE CORY CACTUS	LE	E
CORYPHANTHA RAMILLOSA	BUNCHED CORY CACTUS	LT	T
CROTON POTTSII VAR THERMOPHILUS	LEATHERWEED CROTON		
CRYPTANTHA CRASSIPES	TERLINGUA CREEK CAT'S-EYE	LE	E
DALEA BARTONII	COX'S DALEA		
ECHINOCEREUS CHISOENSIS VAR CHISOENSIS	CHISOS MOUNTAINS HEDGEHOG CACTUS	LT	T
ECHINOCEREUS CHLORANTHUS VAR NEOCAPILLUS	GOLDEN-SPINE HEDGEHOG CACTUS		
ECHINOCEREUS VIRIDIFLORUS VAR CORRELLII	CORRELL'S GREEN PITAYA		
ECHINOCEREUS VIRIDIFLORUS VAR DAVISII	DAVIS' GREEN PITAYA	LE	E
ERIGERON MIMEGLETES	SONORA FLEABANE		
ERIOGONUM SUFFRUTICOSUM	BUSHY WILD-BUCKWHEAT		

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ESCOBARIA CHAFFEYI	CHAFFEY'S CORY CACTUS		
FESTUCA LIGULATA	GUADALUPE MOUNTAINS FESCUE	C1	
GALIUM CORRELLII	CLIFF BEDSTRAW		
GAURA BOQUILLENSIS	BOQUILLAS LIZARDTAIL		
GENISTIDIUM DUMOSUM	BRUSH-PEA		
HEDEOMA PILOSUM	OLD BLUE PENNYROYAL		
HEDYOTIS BUTTERWICKIAE	MARY'S BLUET		
HEDYOTIS POOLEANA	JACKIE'S BLUET		
HEXALECTRIS REVOLUTA	CHISOS CORAL-ROOT		
HEXALECTRIS WARNOCKII	WARNOCK'S CORAL-ROOT		
JUSTICIA WRIGHTII	WRIGHT'S WATER-WILLOW		
KALLSTROEMIA PERENNANS	PERENNIAL CALTROP		
LECHEA MENSALIS	CHISOS PINWEED		
LYCIUM TEXANUM	TEXAS WOLF-BERRY		
MATELEA TEXENSIS	TEXAS MILKVINE		
NEOLLOYDIA MARIPOSENSIS	LLOYD'S MARIPOSA CACTUS	LT	T
OPUNTIA AUREISPINA	GOLDEN-SPINE PRICKLY-PEAR		
OPUNTIA IMBRICATA VAR ARGENTEA	SILVER CHOLLA		
OSTRYA CHISOSENSIS	BIG BEND HOP-HORNBEAM		
PARONYCHIA WILKINSONII	WILKINSON'S WHITLOW-WORT		
PERITYLE BISETOSA VAR APPRESSA	APPRESSED TWO-BRISTLE ROCK-DAISY		
PERITYLE BISETOSA VAR BISETOSA	TWO-BRISTLE ROCK-DAISY		
PERITYLE BISETOSA VAR SCALARIS	STAIRSTEP TWO-BRISTLE ROCK-DAISY		
PERITYLE DISSECTA	SLIMLOBE ROCK-DAISY		
PERITYLE VITREOMONTANA	GLASS MOUNTAINS ROCK-DAISY		
PHACELIA PALLIDA	PALE PHACELIA		
PHYLLANTHUS ERICOIDES	HEATHER LEAF-FLOWER		
POA STRICTIRAMEA	DESERT MOUNTAINS BLUEGRASS		
POLYGALA MARAVILLASENSIS	MARAVILLAS MILKWORT		
PROBOSCIDEA SPICATA	MANY-FLOWERED UNICORN-PLANT		
PRUNUS MURRAYANA	MURRAY'S PLUM		
QUERCUS GRACILIFORMIS	CHISOS OAK		
QUERCUS ROBUSTA	ROBUST OAK		
QUERCUS TARDIFOLIA	LATELEAF OAK		
RORIPPA RAMOSA	DURANGO YELLOW-CRESS		
SEDUM HAVARDII	HAVARD'S STONECROP		
SEDUM ROBERTSIANUM	ROBERTS' STONECROP		
SELAGINELLA VIRIDISSIMA	GREEN SPIKEMOSS		
SENNA ORCUTTII	ORCUTT'S SENNA		
SENNA RIPLEYANA	RIPLEY'S SENNA		
STREPTANTHUS CUTLERI	CUTLER'S TWISTFLOWER		
THELOCACTUS BICOLOR VAR FLAVIDISPINUS	STRAW-SPINE GLORY-OF-TEXAS		
ZANTHOXYLUM PARVUM	SHINNER'S TICKLE-TONGUE	C1	

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Codes:

- LE,LT - Federally Listed Endangered/Threatened
- PE,PT - Federally Proposed Endangered/Threatened
- E/SA,T/SA - Federally Endangered/Threatened by Similarity of Appearance
- C1 - Federal Candidate, Category 1; information supports proposing to list as endangered/threatened
- DL,PDL - Federally Delisted/Proposed Delisted
- E,T - State Endangered/Threatened

Species appearing on these lists do not all share the same probability of occurrence within a county. Some species are migrants or wintering residents only. Additionally, a few species may be historic or considered extirpated within a county. Species considered extirpated within the state are so flagged on each list. Each county's revised date reflects the last date any changes or revisions were made for that county, to reflect current listing statuses and taxonomy.

CAMERON COUNTY

*** AMPHIBIANS ***

	Federal Status	State Status
Black Spotted Newt (*Notophthalmus meridionalis*) - can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods; Gulf Coastal Plain south of the San Antonio River		T
Mexican Treefrog (*Smilisca baudinii*) – subtropical region of extreme southern Texas; breeds May-October coinciding with rainfall, eggs laid in temporary rain pools		T
Sheep Frog (*Hypopachus variolosus*) – predominantly grassland and savanna; moist sites in arid areas		T
South Texas Siren - large form (*Siren* sp. 1) - wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain; southern Texas south of Balcones Escarpment; breeds February-June		T
White-lipped Frog (*Leptodactylus labialis*) - grasslands, cultivated fields, roadside ditches, and a wide variety of other habitats; often hides under rocks or in burrows under clumps of grass; species requirements incompatible with widespread habitat alteration and pesticide use in south Texas		T

*** BIRDS ***

	Federal Status	State Status
American Peregrine Falcon (*Falco peregrinus anatum*) - potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (*Falco peregrinus tundrius*) - potential migrant	DL	T
Audubon's Oriole (*Icterus graduacauda audubonii*) - scrub, mesquite; nests in dense trees, or thickets, usually along water courses		
Brown Pelican (*Pelecanus occidentalis*) - largely coastal and near shore areas, where it roosts on islands and spoil banks	LE	E
Brownsville Common Yellowthroat (*Geothlypis trichas insperata*) - tall grasses and bushes near ponds, marshes, and swamps; breeding April to July		
Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) - riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June		T
Common Black Hawk (*Buteogallus anthracinus*) - cottonwood-lined rivers and streams; willow tree groves on the lower Rio Grande floodplain; formerly bred in south Texas		T
Northern Aplomado Falcon (*Falco femoralis septentrionalis*) - open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species	LE	E
Northern Beardless-tyrannulet (*Camptostoma imberbe*) - mesquite woodlands; near Rio Grande frequents cottonwood, willow, elm, and great leadtree; breeding April to July		T
Piping Plover (*Charadrius melodus*) – wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats	LT	T
Reddish Egret (*Egretta rufescens*) – resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear		T
Rose-throated Becard (*Pachyramphus aglaiae*) - riparian trees, woodlands, open forest, scrub, and mangroves; breeding April to July		T

	Federal Status	State Status
Sennett's Hooded Oriole (*Icterus cucullatus sennetti*) - often builds nests in and of Spanish moss (*Tillandsia unioides*); feeds on invertebrates, fruit, and nectar; breeding March to August		
Snowy Plover (*Charadrius alexandrinus*) - wintering migrant along the Texas Gulf Coast beaches and bayside mud or salt flats		
Sooty Tern (*Sterna fuscata*) – predominately "on the wing"; does not dive, but snatches small fish and squid with bill as it flies or hovers over water; breeding April-July		T
Texas Botteri's Sparrow (*Aimophila botterii texana*) - grassland and short-grass plains with scattered bushes or shrubs, sagebrush, mesquite, or yucca; nests on ground of low clump of grasses		T
Tropical Parula (*Parula pitiayuma*) – dense or open woods, undergrowth, brush, and trees along edges of rivers and resacas; breeding April to July		T
White-faced Ibis (*Plegadis chihi*) – prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats		T
White-tailed Hawk (*Buteo albicaudatus*) - near coast it is found on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March to May		T
Wood Stork (*Mycteria americana*) – forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T
Zone-tailed Hawk (*Buteo albonotatus*) - rough, deep, rocky canyons and streamsides in semiarid mesa, hill, and mountain terrain; breeding March to July		T

*** BIRDS-RELATED ***

Colonial waterbird nesting areas - many rookeries active annually

Migratory songbird fallout areas - oak mottes and other woods/thickets provide foraging/roosting sites for neotropical migratory songbirds

*** FISHES ***

	Federal Status	State Status
River Goby (*Awaous tajasica*) - clear water with slow to moderate current, sandy or hard bottom, and little or no vegetation; also enters brackish and ocean waters		T
Blackfin Goby (*Gobionellus atripinnis*) - brackish and freshwater coastal streams		T
Opossum Pipefish (*Microphis brachyurus*) - brooding adults found in fresh or low salinity waters and young move or are carried into more saline waters after birth		T

*** INSECTS***

Smyth's Tiger Beetle (*Cicindela chlorocephala smythi*) - most tiger beetles are active, usually brightly colored, and found in open, sunny areas; adult tiger beetles are predaceous and feed on a variety of small insects; larvae of tiger beetles are also predaceous and live in vertical burrows in soil of dry paths, fields, or sandy beaches

	Federal Status	State Status
***** MAMMALS *****		
Coues' Rice Rat (*Oryzomys couesi*) – cattail-bulrush marsh with shallower zone of aquatic grasses near the shoreline; shade trees around the shoreline are important features; prefers salt and freshwater, as well as grassy areas near water; breeds April-August		T
Jaguar (*Panthera onca*) (extirpated) – dense chaparral; no reliable TX sightings since 1952	LE	E
Jaguarundi (*Felis yaguarondi*) - thick brushlands, near water favored; six month gestation, young born twice per year in March and August	LE	E
Ocelot (*Felis pardalis*) - dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas; breeds and raises young June-November	LE	E
Plains Spotted Skunk (*Spilogale putorius interrupta*) - catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		
Southern Yellow Bat (*Lasiurus ega*) – associated with trees, such as palm trees (*Sabal mexicana*) in Brownsville, which provide them with daytime roosts; insectivorous; breeding in late winter		T
West Indian Manatee (*Trichechus manatus*) - Gulf and bay system; opportunistic, aquatic herbivore	LE	E
White-nosed Coati (*Nasua narica*) – woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground & in trees; omnivorous; may be susceptible to hunting, trapping, & pet trade		T
Yuma Myotis Bat (*Myotis yumanensis*) – desert regions; most commonly found in lowland habitats near open water, where forages; roosts in caves, abandoned mine tunnels, and buildings; season of partus is May to early July; usually only one young born to each female		
***** MOLLUSKS *****		
Texas Hornshell (*Popenaias popeii*) – Rio Grande drainage from the Pecos River to the Falcon Breaks	C1	
***** REPTILES *****		
Atlantic Hawksbill Sea Turtle (*Eretmochelys imbricata*) - Gulf and bay system	LE	E
Black Striped Snake (*Coniophanes imperialis*) - extreme south Texas; semi-arid coastal plain, warm, moist micro-habitats and sandy soils; proficient burrower; eggs laid April-June		T
Green Sea Turtle (*Chelonia mydas*) – Gulf and bay system	LT	T
Indigo Snake (*Drymarchon corais*) – thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; can do well in suburban and irrigated croplands if not molested or indirectly poisoned; requires moist microhabitats, such as rodent burrows, for shelter		T
Keeled Earless Lizard (*Holbrookia propinqua*) - coastal dunes, barrier islands, and other sandy areas; eats insects and likely other small invertebrates; lays clutches of 2-7 eggs March-September (most May-August) in soil/underground		
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) - Gulf and bay system	LE	E
Leatherback Sea Turtle (*Dermochelys coriacea*) - Gulf and bay system	LE	E
Loggerhead Sea Turtle (*Caretta caretta*) - Gulf and bay system	LT	T
Northern Cat-eyed Snake (*Leptodeira septentrionalis*) - Gulf Coastal Plain south of the		T

	Federal Status	State Status
Nueces River; thorn brush woodland; dense thickets bordering ponds and streams; semi-arboreal; nocturnal		
Speckled Racer (*Drymobius margaritiferus*) - extreme south Texas; dense thickets near water, Texas palm groves, riparian woodlands; often in areas with much vegetation litter on ground; breeds April-August		T
Texas Horned Lizard (*Phrynosoma cornutum*) - open arid or semi-arid regions with sparse vegetation; grass, cactus, scattered brush or scrubby trees; burrows into soil, uses rodent burrows, or hides under surface cover		T
Texas Tortoise (*Gopherus berlandieri*) - open scrub woods, arid brush, lomas, grass-cactus association; open brush with grass understory preferred; uses shallow depressions at base of bush or cactus or underground burrow or hides under surface cover		T

*** VASCULAR PLANTS ***

	Federal Status	State Status
Bailey's ballmoss (*Tillandsia baileyi*) – epiphytic on various trees and shrubs; flowering February-May		
Lila de los Llanos (*Echeandia chandleri*) - grasslands and openings in subtropical woodlands and brush on clay soils; common in windblown saline clay on lomas near mouth of Rio Grande; flowering (May?) September-December; fruiting October-December		
Mexican mud-plantain (*Heteranthera mexicana*) - aquatic; ditches and ponds; flowering June-August		
Plains gumweed (*Grindelia oolepis*) – endemic; prairies and grasslands on black clay soils of the Gulf Coastal Bend; may occur along railroad rights-of-way and in urban areas; flowering May-December		
Runyon's cory cactus (*Coryphantha macromeris* var. *runyonii*) - endemic; low hills and flats on gravelly soils in Tamaulipan shrub communities along the Rio Grande		
Runyon's water willow (*Justicia runyonii*) - calcareous silt loam, silty clay, or clay in openings in subtropical woodlands on active or former floodplains; flowering (July-) September-November		
South Texas ambrosia (*Ambrosia cheiranthifolia*) - open prairies and various shrublands on deep clay soils; flowering July-November	LE	E
St. Joseph's staff (*Manfreda longiflora*) - endemic; various soils (clays and loams with various concentrations of salt, caliche, sand, and gravel) in openings or amongst shrubs in thorny shrublands; on Catahoula and Frio formations, and also on Rio Grande floodplain alluvial deposits; flowering in September		
Star cactus (*Astrophytum asterias*) – gravelly saline clays or loams over the Catahoula and Frio formations, on gentle slopes and flats in grasslands or shrublands; flowering in May	LE	E
Texas ayenia (*Ayenia limitaris*) – woodlands on alluvial deposits on floodplains and terraces along the Rio Grande; flowering throughout the year with sufficient rainfall	LE	E
Vasey's adelia (*Adelia vaseyi*) – subtropical woodlands in Lower Rio Grande Valley; flowering January-June		

Federal *Status* State *Status*

PE,PT - Federally Proposed Endangered/Threatened
E/SA,T/SA - Federally Endangered/Threatened by Similarity of Appearance
C1 - Federal Candidate, Category 1; information supports proposing to list as endangered/threatened
DL,PDL - Federally Delisted/Proposed Delisted
E,T - State Endangered/Threatened
"blank" - Rare, but with no regulatory listing status

Species appearing on these lists do not all share the same probability of occurrence. Some species are migrants or wintering residents only, or may be historic or considered extirpated.

TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
EL PASO COUNTY

Revised:
98-04-30

Scientific Name	Common Name	Federal Status	State Status
*** AMPHIBIANS			
RANA PIPIENS	NORTHERN LEOPARD FROG		
*** BIRDS			
BUTEO ALBONOTATUS	ZONE-TAILED HAWK		T
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	E
FALCO PEREGRINUS	PEREGRINE FALCON	~~E/SA~~ DL	E,T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	LT	T
Athene cunicularia hypugaea	Western Burrowing Owl		
*** FISHES			
NOTROPIS SIMUS (extirpated)	BLUNTNOSE SHINER		T
*** MAMMALS			
CYNOMYS LUDOVICIANUS ~~ARIZONENSIS~~	~~ARIZONA~~ BLACK-TAILED PRAIRIE DOG	C	
GEOMYS ARENARIUS	DESERT POCKET GOPHER		
MYOTIS THYSANODES	FRINGED MYOTIS BAT		
MYOTIS YUMANENSIS	YUMA MYOTIS BAT		
ONDATRA ZIBETHICUS RIPENSIS	PECOS RIVER MUSKRAT		
*** MOLLUSKS			
ASHMUNELLA PASONIS	FRANKLIN MOUNTAIN WOOD SNAIL		
SONORELLA METCALFI	FRANKLIN MOUNTAIN TALUS SNAIL		
*** REPTILES			
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
PHRYNOSOMA HERNANDESI	MOUNTAIN SHORT-HORNED LIZARD		T
THAMNOPHIS SIRTALIS DORSALIS	NEW MEXICO GARTER SNAKE		
TRACHEMYS GAIGEAE	BIG BEND SLIDER		
TRIMORPHODON BISCUTATUS	TEXAS LYRE SNAKE		T
*** VASCULAR PLANTS			
ALLOLEPIS TEXANA	TEXAS FALSE SALTGRASS		
BRICKELLIA BACCHARIDEA	RESIN-LEAF BRICKELLBUSH		
CEREUS GREGGII VAR GREGGII	DESERT NIGHT-BLOOMING CEREUS		
CHAMAESYCE GEYERI VAR WHEELERIANA	WHEELER'S SPURGE		
COLUBRINA STRICTA	COMAL SNAKEWOOD		
CORYPHANTHA DASYACANTHA VAR DASYACANTHA	DENSE CORY CACTUS		
CORYPHANTHA SNEEDII VAR SNEEDII	SNEED PINCUSHION CACTUS	LE	E
NOLINA ARENICOLA	SAND SACAHUISTA		
OPUNTIA ARENARIA	SAND PRICKLY-PEAR		

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PENSTEMON ALAMOSENSIS	ALAMO BEARDTONGUE
PERITYLE HUECOENSIS	HUECO ROCK-DAISY

Codes:

- LE,LT - Federally Listed Endangered/Threatened
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Species appearing on these lists do not all share the same probability of occurrence within a county. Some species are migrants or wintering residents only. Additionally, a few species may be historic or considered extirpated within a county. Species considered extirpated within the state are so flagged on each list. Each county's revised date reflects the last date any changes or revisions were made for that county, to reflect current listing statuses and taxonomy.

HIDALGO COUNTY

*** AMPHIBIANS ***

	Federal Status	State Status
Black Spotted Newt (*Notophthalmus meridionalis*) - can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods; Gulf Coastal Plain south of the San Antonio River		T
Mexican Treefrog (*Smilisca baudinii*) - subtropical region of extreme southern Texas; breeds May-October coinciding with rainfall, eggs laid in temporary rain pools		T
Sheep Frog (*Hypopachus variolosus*) - predominantly grassland and savanna; moist sites in arid areas		T
South Texas Siren - large form (*Siren* sp. 1) - wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain; southern Texas south of Balcones Escarpment; breeds February-June		T
White-lipped Frog (*Leptodactylus labialis*) – grasslands, cultivated fields, roadside ditches, and a wide variety of other habitats; often hides under rocks or in burrows under clumps of grass; species requirements incompatible with widespread habitat alteration and pesticide use in south Texas		T

*** BIRDS ***

	Federal Status	State Status
American Peregrine Falcon (*Falco peregrinus anatum*) - potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (*Falco peregrinus tundrius*) - potential migrant	DL	T
Audubon's Oriole (*Icterus graduacauda audubonii*) - scrub, mesquite; nests in dense trees, or thickets, usually along water courses		
Brownsville Common Yellowthroat (*Geothlypis trichas insperata*) - tall grasses and bushes near ponds, marshes, and swamps; breeding April to July		
Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) - riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June		T
Common Black Hawk (*Buteogallus anthracinus*) – cottonwood-lined rivers and streams; willow tree groves on the lower Rio Grande floodplain; formerly bred in south Texas		T
Gray Hawk (*Buteo nitidus*) - mature woodlands of river valleys and nearby semiarid mesquite and scrub grasslands		T
Hook-billed Kite (*Chondrohierax uncinatus*) – dense tropical and subtropical forests, but does occur in open woodlands; uncommon to rare in most of range; accidental in south Texas		
Interior Least Tern (*Sterna antillarum athalassos*) – nests along sand and gravel bars within braided streams, rivers & some inland lakes	LE	E
Northern Beardless-tyrannulet (*Camptostoma imberbe*) - mesquite woodlands; near Rio Grande frequents cottonwood, willow, elm, and great leadtree; breeding April to July		T
Reddish Egret (*Egretta rufescens*) - resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear		T
Rose-throated Becard (*Pachyramphus aglaiae*) – riparian trees, woodlands, open forest, scrub, and mangroves; breeding April to July		T
Sennett's Hooded Oriole (*Icterus cucullatus sennetti*) - often builds nests in and of Spanish moss (*Tillandsia unioides*); feeds on invertebrates, fruit, and nectar; breeding March to August		

	Federal Status	State Status
Tropical Parula (*Parula pitiayumi*) - dense or open woods, undergrowth, brush, and trees along edges of rivers and resacas; breeding April to July		T
White-faced Ibis (*Plegadis chihi*) - prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats		T
White-tailed Hawk (*Buteo albicaudatus*) - near coast it is found on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March to May		T
Wood Stork (*Mycteria americana*) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T
Zone-tailed Hawk (*Buteo albonotatus*) - rough, deep, rocky canyons and streamsides in semiarid mesa, hill, and mountain terrain; breeding March to July		T

*** FISHES ***

	Federal Status	State Status
River Goby (*Awaous tajasica*) - clear water with slow to moderate current, sandy or hard bottom, and little or no vegetation; also enters brackish and ocean waters		T
Bluntnose Shiner (*Notropis simus*) (extirpated) – main river channels, often below obstructions over substrate of sand, gravel, and silt; damming and irrigation practices presumed major factors contributing to decline		T

*** INSECTS***

	Federal Status	State Status
Subtropical Blue-black Tiger Beetle (*Cicindela nigrocoerulea subtropica*) - most tiger beetles are active, usually brightly colored, and found in open, sunny areas; adult tiger beetles are predaceous and feed on a variety of small insects; larvae of tiger beetles are also predaceous and live in vertical burrows in soil of dry paths, fields, or sandy beaches		
Maculated Manfreda Skipper (*Stallingsia maculosus*) - most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk-		

*** MAMMALS ***

	Federal Status	State Status
Cave Myotis Bat (*Myotis velifer*) - colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (*Hirundo pyrrhonota*) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore		
Coues' Rice Rat (*Oryzomys couesi*) - cattail-bulrush marsh with shallower zone of aquatic grasses near the shoreline; shade trees around the shoreline are important features; prefers salt and freshwater, as well as grassy areas near water; breeds April-August		T
Jaguar (*Panthera onca*) (extirpated) - dense chaparral; no reliable TX sightings since 1952	LE	E
Jaguarundi (*Felis yaguarondi*) - thick brushlands, near water favored; six month gestation, young born twice per year in March and August	LE	E
Mexican Long-tongued Bat (*Choeronycteris mexicana*) - deep canyons where uses caves		

	Federal Status	State Status
& mine tunnels as day roosts; also found in buildings & often associated with big-eared bats (*Plecotus* spp.); single TX record from Santa Ana NWR		
Ocelot (*Felis pardalis*) - dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas; breeds and raises young June-November	LE	E
Southern Yellow Bat (*Lasiurus ega*) - associated with trees, such as palm trees (*Sabal mexicana*) in Brownsville, which provide them with daytime roosts; insectivorous; breeding in late winter		T
White-nosed Coati (*Nasua narica*) - woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground & in trees; omnivorous; may be susceptible to hunting, trapping, & pet trade		T
***** MOLLUSKS *****		
Texas Hornshell (*Popenaias popeii*) - Rio Grande drainage from the Pecos River to the Falcon Breaks	C1	
***** REPTILES *****		
Reticulate Collared Lizard (*Crotaphytus reticulatus*) - requires open brush-grasslands; thorn-scrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils; often on scattered flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly pear and mesquite		T
Black Striped Snake (*Coniophanes imperialis*) – extreme south Texas; semi-arid coastal plain, warm, moist micro-habitats and sandy soils; proficient burrower; eggs laid April-June		T
Indigo Snake (*Drymarchon corais*) - thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; can do well in suburban and irrigated croplands if not molested or indirectly poisoned; requires moist microhabitats, such as rodent burrows, for shelter		T
Keeled Earless Lizard (*Holbrookia propinqua*) – coastal dunes, barrier islands, and other sandy areas; eats insects and likely other small invertebrates; lays clutches of 2-7 eggs March-September (most May-August) in soil/underground		
Northern Cat-eyed Snake (*Leptodeira septentrionalis*) - Gulf Coastal Plain south of the Nueces River; thorn brush woodland; dense thickets bordering ponds and streams; semi-arboreal; nocturnal		T
Speckled Racer (*Drymobius margaritiferus*) - extreme south Texas; dense thickets near water, Texas palm groves, riparian woodlands; often in areas with much vegetation litter on ground; breeds April-August		T
Texas Horned Lizard (*Phrynosoma cornutum*) – open arid or semi-arid regions with sparse vegetation; grass, cactus, scattered brush or scrubby trees; burrows into soil, uses rodent burrows, or hides under surface cover		T
Texas Tortoise (*Gopherus berlandieri*) - open scrub woods, arid brush, lomas, grass-cactus association; open brush with grass understory preferred; shallow depressions at base of bush or cactus or underground burrow or hides under surface cover		T
***** VASCULAR PLANTS *****		
Bailey's ballmoss (*Tillandsia baileyi*) - epiphytic on various trees and shrubs; flowering February-May		
Chihuahua balloon-vine (*Cardiospermum dissectum*) - shrublands on gravelly soils along Lower Rio Grande Valley; flowering July-September		

Species	Federal Status	State Status
Falfurrias milkvine (*Matelea radiata*) - endemic; known only from one collection from Falfurrias; habitat unknown; flowering (May?) June		
Gregg's wild-buckwheat (*Eriogonum greggii*) – grasslands and brushlands on gypsum-capped hills; flowering in summer?		
Mexican mud-plantain (*Heteranthera mexicana*) – aquatic; ditches and ponds; flowering June-August		
Runyon's cory cactus (*Coryphantha macromeris* var. *runyonii*) - endemic; low hills and flats on gravelly soils in Tamaulipan shrub communities along the Rio Grande		
Runyon's water willow (*Justicia runyonii*) - calcareous silt loam, silty clay, or clay in openings in subtropical woodlands on active or former floodplains; flowering (July-) September-November		
Small papillosus cactus (*Echinocereus papillosus* var. *angusticeps*) - endemic; sandy to gravelly soils in grasslands or mesquite-acacia shrublands		
St. Joseph's staff (*Manfreda longiflora*) - endemic; various soils (clays and loams with various concentrations of salt, caliche, sand, and gravel) in openings or amongst shrubs in thorny shrublands; on Catahoula and Frio formations, and also on Rio Grande floodplain alluvial deposits; flowering in September		
Star cactus (*Astrophytum asterias*) - gravelly saline clays or loams over Catahoula & Frio formations, on gentle slopes & flats in grasslands or shrublands; flowering in May	LE	E
Texas ayenia (*Ayenia limitaris*) - woodlands on alluvial deposits on floodplains and terraces along the Rio Grande; flowering throughout the year with sufficient rainfall	LE	E
Texas windmill-grass (*Chloris texensis*) - endemic; sandy to sandy loam soils in open to sometimes barren areas in prairies and grasslands, including ditches and roadsides; flowering in fall		
Vasey's adelia (*Adelia vaseyi*) - subtropical woodlands in Lower Rio Grande Valley; flowering January-June		
Walker's manioc (*Manihot walkerae*) - periphery of native brush in sandy loam; also on caliche cuestas?; flowering April-September (following rains?)	LE	E

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
HUDSPETH COUNTY

Revised:
98-04-30

Scientific Name	Common Name	Federal Status	State Status
*** BIRDS			
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	E
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
*** INSECTS			
CICINDELA POLITULA BARBARANNAE	BARBARA ANN'S TIGER BEETLE		
*** MAMMALS			
CYNOMYS LUDOVICIANUS ~~ARIZONENSIS~~	~~ARIZONA~~ BLACK-TAILED PRAIRIE DOG	C	
GEOMYS ARENARIUS	DESERT POCKET GOPHER		
MYOTIS THYSANODES	FRINGED MYOTIS BAT		
MYOTIS VELIFER	CAVE MYOTIS BAT		
*** REPTILES			
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
PHRYNOSOMA HERNANDESI	MOUNTAIN SHORT-HORNED LIZARD		T
TRACHEMYS GAIGEAE	BIG BEND SLIDER		
TRIMORPHODON BISCUTATUS	TEXAS LYRE SNAKE		T
*** VASCULAR PLANTS			
AGAVE GLOMERULIFLORA	CHISOS AGAVE		
ASTRAGALUS GYPSODES	GYP LOCOWEED		
BRICKELLIA BRACHYPHYLLA VAR TERLINGUENSIS	TERLINGUA BRICKELLBUSH		
CEREUS GREGGII VAR GREGGII	DESERT NIGHT-BLOOMING CEREUS		
CHAETOPAPPA HERSHEYI	MAT LEASTDAISY		
CHAMAESYCE GEYERI VAR WHEELERIANA	WHEELER'S SPURGE		
CHAMAESYCE GOLONDRINA	SWALLOW SPURGE		
CORYPHANTHA DASYACANTHA VAR DASYACANTHA	DENSE CORY CACTUS		
LEPIDOSPARTUM BURGESSII	GYPSUM SCALEBROOM		
LESQUERELLA VALIDA	STRONG BLADDERPOD		
LYCIUM TEXANUM	TEXAS WOLF-BERRY		
NOLINA ARENICOLA	SAND SACAHUISTA		
OPUNTIA ARENARIA	SAND PRICKLY-PEAR		
POLYGALA RIMULICOLA VAR RIMULICOLA	ROCK CREVICE MILKWORT		
PSEUDOCLAPPIA WATSONII	WATSON'S FALSE CLAPPIA-BUSH		
SCLEROCACTUS PAPYRACANTHUS	PAPER-SPINE CACTUS		
SCUTELLARIA LAEVIS	SMOOTH-STEM SKULLCAP		

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
JEFF DAVIS COUNTY

Revised:
98-04-21

Scientific Name	Common Name	Federal Status	State Status
*** BIRDS			
BUTEO ALBONOTATUS	ZONE-TAILED HAWK		T
BUTEO NITIDUS	GRAY HAWK		T
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK		T
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	~~C1~~ PT	
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	E
FALCO PEREGRINUS	PEREGRINE FALCON	~~E/SA~~ DL	E, T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	LT	T
*** CRUSTACEANS			
GAMMARUS HYALLELOIDES	DIMINUTIVE AMPHIPOD		
*** FISHES			
CYPRINODON ELEGANS	COMANCHE SPRINGS PUPFISH	LE	E
GAMBUSIA NOBILIS	PECOS GAMBUSIA	LE	E
GILA PANDORA	RIO GRANDE CHUB		T
*** INSECTS			
LIMNEBIUS TEXANUS	TEXAS MINUTE MOSS BEETLE		
*** MAMMALS			
CANIS LUPUS (extirpated)	GRAY WOLF	LE	E
MYOTIS THYSANODES	FRINGED MYOTIS BAT		
MYOTIS VELIFER	CAVE MYOTIS BAT		
MYOTIS VOLANS	LONG-LEGGED MYOTIS BAT		
MYOTIS YUMANENSIS	YUMA MYOTIS BAT		
SIGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT		
SYLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL		
THOMOMYS BOTTAE LIMPIAE	LIMPIA SOUTHERN POCKET GOPHER		
THOMOMYS BOTTAE TEXENSIS	LIMPIA CREEK POCKET GOPHER		
URSUS AMERICANUS	BLACK BEAR	~~T/SA~~	T
*** MOLLUSKS			
COCHLIOPA TEXANA	PHANTOM CAVE SNAIL		
FONTELICELLA DAVISI	DAVIS SPRING SNAIL		
HUMBOLDTIANA CHEATUMI	DAVIS MOUNTAINS THREEBAND		
HUMBOLDTIANA FERRISSIANA	MITRE PEAK THREEBAND		
HUMBOLDTIANA PALMERI	MOUNT LIVERMORE THREEBAND		
TRYONIA BRUNEI	BRUNE'S TRYONIA		
TRYONIA CHEATUMI	PHANTOM CAVE SPRING TRYONIA		
*** REPTILES			
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
PHRYNOSOMA HERNANDESI	MOUNTAIN SHORT-HORNED LIZARD		T
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE		T
TRACHEMYS GAIGEAE	BIG BEND SLIDER		

*** VASCULAR PLANTS

ALLOLEPIS TEXANA	TEXAS FALSE SALTGRASS		
ANULOCAULIS REFLEXUS	OJINAGA RINGSTEM		
ARENARIA LIVERMORENSIS	LIVERMORE SANDWORT		
ASTRAGALUS MOLLISSIMUS VAR MARCIDUS	WITHERED WOOLLY LOCO		
BRICKELLIA BRACHYPHYLLA VAR HINCKLEYI	HINCKLEY'S BRICKELLBUSH		
CASTILLEJA CILIATA	FRINGED PAINTBRUSH		
CEREUS GREGGII VAR GREGGII	DESERT NIGHT-BLOOMING CEREUS		
CORYPHANTHA DASYACANTHA VAR DASYACANTHA	DENSE CORY CACTUS		
DRABA STANDLEYI	STANDLEY'S DRABA		
HEXALECTRIS WARNOCKII	WARNOCK'S CORAL-ROOT		
OSMORHIZA MEXICANA SSP BIPATRIATA	LIVERMORE SWEET-CICELY		
PENSTEMON CARDINALIS SSP REGALIS	ROYAL RED PENSTEMON		
PHILADELPHUS CRINITUS	BEARDED MOCK-ORANGE		
POLEMONIUM PAUCIFLORUM SSP HINCKLEYI	HINCKLEY'S JACOB'S-LADDER		
POTAMOGETON CLYSTOCARPUS	LITTLE AGUJA PONDWEED	LE	E
PROBOSCIDEA SPICATA	MANY-FLOWERED UNICORN-PLANT		
PRUNUS MURRAYANA	MURRAY'S PLUM		
PSEUDOCLAPPIA WATSONII	WATSON'S FALSE CLAPPIA-BUSH		
QUERCUS DEPRESSIPES	MEXICAN DWARF OAK		
SEDUM HAVARDII	HAVARD'S STONECROP		
SELAGINELLA VIRIDISSIMA	GREEN SPIKEMOSS		
SOLANUM LEPTOSEPALUM	TIGNA POTATO		
STYRAX YOUNGIAE	YOUNG'S SNOWBELLS		
ZANTHOXYLUM PARVUM	SHINNER'S TICKLE-TONGUE	~~C1~~	

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
KINNEY COUNTY

Revised:
98-04-30

Scientific Name	Common Name	Federal Status	State Status
*** AMPHIBIANS			
EURYCEA SP 7	EDWARDS PLATEAU SPRING SALAMANDERS		
*** BIRDS			
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK		T
DENDROICA CHRYSOPARIA	GOLDEN-CHEEKED WARBLER	LE	E
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
ICTERUS CUCULLATUS CUCULLATUS	MEXICAN HOODED ORIOLE		
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	LE	E
VIREO ATRICAPILLUS	BLACK-CAPPED VIREO	LE	E
*** FISHES			
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER		T
CYCLEPTUS ELONGATUS	BLUE SUCKER		T
CYPRINELLA PROSERPINA	PROSERPINE SHINER		T
DIONDA DIABOLI	DEVILS RIVER MINNOW	PE	T
*** INSECTS			
STALLINGSIA MACULOSUS	MACULATED MANFREDA SKIPPER		
*** MAMMALS			
FELIS PARDALIS	OCELOT	LE	E
FELIS YAGUARONDI	JAGUARUNDI	LE	E
GEOMYS PERSONATUS FUSCUS	TEXAS POCKET GOPHER		
*** MOLLUSKS			
POPENAIAS POPEI	TEXAS HORNSHELL	C	
*** REPTILES			
DRYMARCHON CORAIS	INDIGO SNAKE		T
GOPHERUS BERLANDIERI	TEXAS TORTOISE		T
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD		
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
*** VASCULAR PLANTS			
ACLEISANTHES CRASSIFOLIA	TEXAS TRUMPETS		
ANCISTROCACTUS TOBUSCHII	TOBUSCH FISHHOOK CACTUS	LE	E
ARGYTHAMNIA ARGYRAEA	SILVERY WILD-MERCURY		
CAESALPINIA BRACHYCARPA	BROADPOD RUSHPEA		
CARDAMINE MACROCARPA VAR TEXANA	TEXAS LARGESEED BITTERCRESS		

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
MAVERICK COUNTY

Revised:
98-03-27

Scientific Name	Common Name	Federal Status	State Status
*** AMPHIBIANS			
SIREN SP 1	SOUTH TEXAS SIREN (LARGE FORM)		T
*** BIRDS			
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK		T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
MYCTERIA AMERICANA	WOOD STORK		T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	LE	E
*** FISHES			
CYPRINELLA PROSERPINA	PROSERPINE SHINER		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER		
*** MAMMALS			
FELIS PARDALIS	OCELOT	LE	E
FELIS WIEDII (extirpated)	MARGAY		T
FELIS YAGUARONDI	JAGUARUNDI	LE	E
MYOTIS VELIFER	CAVE MYOTIS BAT		
NASUA NARICA	WHITE-NOSED COATI		T
URSUS AMERICANUS	BLACK BEAR	~~T/SA~~	T
*** MOLLUSKS			
POPENAIAS POPEI	TEXAS HORNSHELL	C	
*** REPTILES			
CROTAPHYTUS RETICULATUS	RETICULATE COLLARED LIZARD		T
DRYMARCHON CORAIS	INDIGO SNAKE		T
GOPHERUS BERLANDIERI	TEXAS TORTOISE		T
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD		
HOLBROOKIA PROPINQUA	KEELED EARLESS LIZARD		
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
TANTILLA ATRICEPS	MEXICAN BLACKHEAD SNAKE		
*** VASCULAR PLANTS			
ACLEISANTHES CRASSIFOLIA	TEXAS TRUMPETS		
ARGYTHAMNIA ARGYRAEA	SILVERY WILD-MERCURY		

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
PRESIDIO COUNTY

Revised:
98-04-21

Scientific Name	Common Name	Federal Status	State Status
*** BIRDS			
AIMOPHILA BOTTERII ARIZONAE	ARIZONA BOTTERI'S SPARROW		T
BUTEO ALBONOTATUS	ZONE-TAILED HAWK		T
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	E
FALCO FEMORALIS SEPTENTRIONALIS	NORTHERN APLOMADO FALCON	LE	E
FALCO PEREGRINUS	PEREGRINE FALCON	~~E/SA~~ DL	E, T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
*** FISHES			
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER		T
CYCLEPTUS ELONGATUS	BLUE SUCKER		T
CYPRINODON EXIMIUS	CONCHOS PUPFISH		T
MOXOSTOMA AUSTRINUM	WEST MEXICAN REDHORSE		
NOTROPIS CHIHUAHUA	CHIHUAHUA SHINER		T
*** MAMMALS			
CANIS LUPUS (extirpated)	GRAY WOLF	LE	E
CYNOMYS LUDOVICIANUS ~~ARIZONENSIS~~	~~ARIZONA~~ BLACK-TAILED PRAIRIE DOG	C	
EUMOPS PERCTIS CALIFORNICUS	GREATER WESTERN MASTIFF BAT		
LEPTONYCTERIS NIVALIS	GREATER LONG-NOSED BAT	LE	E
MYOTIS THYSANODES	FRINGED MYOTIS BAT		
MYOTIS VELIFER	CAVE MYOTIS BAT		
MYOTIS VOLANS	LONG-LEGGED MYOTIS BAT		
MYOTIS YUMANENSIS	YUMA MYOTIS BAT		
ONDATRA ZIBETHICUS RIPENSIS	PECOS RIVER MUSKRAT		
SCALOPUS AQUATICUS TEXANUS	PRESIDIO MOLE		
SIGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT		
SYLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL		
URSUS AMERICANUS	BLACK BEAR	~~T/SA~~	T
*** MOLLUSKS			
FONTELICELLA METCALFI	PRESIDIO COUNTY SPRING SNAIL		
HUMBOLDTIANA HOEGIANA PRAESIDII	SAN CARLOS THREEBAND		
*** REPTILES			
COLEONYX RETICULATUS	RETICULATED GECKO		T
KINOSTERNON HIRTIPES	CHIHUAHUAN MUD TURTLE		T
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE		T
TRACHEMYS GAIGEAE	BIG BEND SLIDER		
TRIMORPHODON BISCUTATUS	TEXAS LYRE SNAKE		T

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*** VASCULAR PLANTS

ALLOLEPIS TEXANA	TEXAS FALSE SALTGRASS		
ANDRACHNE ARIDA	TRANS-PECOS MAIDENBUSH		
ANULOCAULIS REFLEXUS	OJINAGA RINGSTEM		
AQUILEGIA CHRYSANTHA VAR CHAPLINEI	GUADALUPE MOUNTAINS COLUMBINE		
AQUILEGIA CHRYSANTHA VAR HINCKLEYANA	HINCKLEY'S COLUMBINE		
ASTRAGALUS MOLLISSIMUS VAR MARCIDUS	WITHERED WOOLLY LOCO		
BRICKELLIA VIEJENSIS	SIERRA VIEJA BRICKELLBUSH		
CEREUS GREGGII VAR GREGGII	DESERT NIGHT-BLOOMING CEREUS		
CHAMAESYCE GOLONDRINA	SWALLOW SPURGE		
CLEOME MULTICAULIS	MANYSTEM SPIDERFLOWER		
CORYPHANTHA ALBICOLUMNARIA	WHITE COLUMN CACTUS		
CORYPHANTHA DUNCANII	DUNCAN'S CORY CACTUS		
ECHINOCEREUS CHLORANTHUS VAR NEOCAPILLUS	GOLDEN-SPINE HEDGEHOG CACTUS		
ELEOCHARIS CYLINDRICA	CYLINDER SPIKESEDGE		
ERIOGONUM SUFFRUTICOSUM	BUSHY WILD-BUCKWHEAT		
EYSENHARDTIA SPINOSA	SPINY KIDNEY-WOOD		
GAURA BOQUILLENSIS	BOQUILLAS LIZARDTAIL		
KALLSTROEMIA PERENNANS	PERENNIAL CALTROP		
MIMULUS DENTILOBUS	FRINGED MONKEYFLOWER		
PEDIOMELUM PENTAPHYLLUM	THREE-NERVE SCURFPEA		
PERITYLE DISSECTA	SLIMLOBE ROCK-DAISY		
PROBOSCIDEA SPICATA	MANY-FLOWERED UNICORN-PLANT		
QUERCUS HINCKLEYI	HINCKLEY'S OAK	LT	T
SOLANUM LEPTOSEPALUM	TIGNA POTATO		
THELYPODIUM TENUE	FRESNO CREEK THELYPODY		

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STARR COUNTY

	Federal Status	State Status
***** AMPHIBIANS *****		
Black Spotted Newt (*Notophthalmus meridionalis*) - can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods; Gulf Coastal Plain south of the San Antonio River		T
Mexican Burrowing Toad (*Rhynophrynus dorsalis*) - roadside ditches, temporary ponds, arroyos, or wherever loose friable soils are present in which to burrow; generally underground emerging only to breed or during rainy periods		T
Mexican Treefrog (*Smilisca baudinii*) – subtropical region of extreme southern Texas; breeds May-October coinciding with rainfall, eggs laid in temporary rain pools		T
Sheep Frog (*Hypopachus variolosus*) – predominantly grassland and savanna; moist sites in arid areas		T
South Texas Siren - large form (*Siren* sp. 1) - wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain; southern Texas south of Balcones Escarpment; breeds February-June		T
White-lipped Frog (*Leptodactylus labialis*) - grasslands, cultivated fields, roadside ditches, and a wide variety of other habitats; often hides under rocks or in burrows under clumps of grass; species requirements incompatible with widespread habitat alteration and pesticide use in south Texas		T
***** BIRDS *****		
American Peregrine Falcon (*Falco peregrinus anatum*) - potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (*Falco peregrinus tundrius*) - potential migrant	DL	T
Audubon's Oriole (*Icterus graduacauda audubonii*) - scrub, mesquite; nests in dense trees, or thickets, usually along water courses		
Brownsville Common Yellowthroat (*Geothlypis trichas insperata*) - tall grasses and bushes near ponds, marshes, and swamps; breeding April to July		
Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) - riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June		T
Common Black Hawk (*Buteogallus anthracinus*) – cottonwood-lined rivers and streams; willow tree groves on the lower Rio Grande floodplain; formerly bred in south Texas		T
Gray Hawk (*Buteo nitidus*) - mature woodlands of river valleys and nearby semiarid mesquite and scrub grasslands		T
Hook-billed Kite (*Chondrohierax uncinatus*) - dense tropical and subtropical forests, but does occur in open woodlands; uncommon to rare in most of range; accidental in south Texas		
Interior Least Tern (*Sterna antillarum athalassos*) – nests along sand and gravel bars within braided streams, rivers & some inland lakes	LE	E
Northern Beardless-tyrannulet (*Camptostoma imberbe*) - mesquite woodlands; near Rio Grande frequents cottonwood, willow, elm, and great leadtree; breeding April to July		T
Reddish Egret (*Egretta rufescens*) – resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear		T
Rose-throated Becard (*Pachyramphus aglaiae*) – riparian trees, woodlands, open forest, scrub, and mangroves; breeding April to July		T

Species	Federal Status	State Status
Sennett's Hooded Oriole (*Icterus cucullatus sennetti*) - often builds nests in and of Spanish moss (*Tillandsia unioides*); feeds on invertebrates, fruit, and nectar; breeding March to August		
Tropical Parula (*Parula pitiayuma*) – dense or open woods, undergrowth, brush, and trees along edges of rivers and resacas; breeding April to July		T
White-tailed Hawk (*Buteo albicaudatus*) - near coast it is found on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March to May		T
Wood Stork (*Mycteria americana*) – forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T
Zone-tailed Hawk (*Buteo albonotatus*) - rough, deep, rocky canyons and streamsides in semiarid mesa, hill, and mountain terrain; breeding March to July		T

*** INSECTS***

Species	Federal Status	State Status
Cazier's Tiger Beetle (*Cicindela cazieri*) - most tiger beetles are active, usually brightly colored, and found in open, sunny areas; adult tiger beetles are predaceous and feed on a variety of small insects; larvae of tiger beetles are also predaceous and live in vertical burrows in soil of dry paths, fields, or sandy beaches		
Maculated Manfreda Skipper (*Stallingsia maculosus*) - most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk		

*** MAMMALS ***

Species	Federal Status	State Status
Coues' Rice Rat (*Oryzomys couesi*) – cattail-bulrush marsh with shallower zone of aquatic grasses near the shoreline; shade trees around the shoreline are important features; prefers salt and freshwater, as well as grassy areas near water; breeds April-August		T
Jaguarundi (*Felis yaguarondi*) - thick brushlands, near water favored; six month gestation, young born twice per year in March and August	LE	E
Ocelot (*Felis pardalis*) - dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas; breeds and raises young June-November	LE	E
Plains Spotted Skunk (*Spilogale putorius interrupta*) - catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		
White-nosed Coati (*Nasua narica*) – woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground & in trees; omnivorous; may be susceptible to hunting, trapping, & pet trade		T
Yuma Myotis Bat (*Myotis yumanensis*) - desert regions; most commonly found in lowland habitats near open water, where forages; roosts in caves, abandoned mine tunnels, and buildings; season of partus is May to early July; usually only one young born to each female		

*** MOLLUSKS ***

	Federal Status	State Status
Texas Hornshell (*Popenaias popeii*) – Rio Grande drainage from the Pecos River to the Falcon Breaks	C1	

*** REPTILES ***

	Federal Status	State Status
Indigo Snake (*Drymarchon corais*) – thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; can do well in suburban and irrigated croplands if not molested or indirectly poisoned; requires moist microhabitats, such as rodent burrows, for shelter		T
Keeled Earless Lizard (*Holbrookia propinqua*) - coastal dunes, barrier islands, and other sandy areas; eats insects and likely other small invertebrates; lays clutches of 2-7 eggs March-September (most May-August) in soil/underground		
Reticulate Collared Lizard (*Crotaphytus reticulatus*) - requires open brush-grasslands; thorn-scrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils; often on scattered flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly pear and mesquite		T
Spot-tailed Earless Lizard (*Holbrookia lacerata*) - central & southern Texas and Adjacent Mexico; oak-juniper woodlands & mesquite-prickly pear associations; eggs laid underground; eats small invertebrates		
Texas Horned Lizard (*Phrynosoma cornutum*) - open arid or semi-arid regions with sparse vegetation; grass, cactus, scattered brush or scrubby trees; burrows into soil, uses rodent burrows, or hides under surface cover		T
Texas Tortoise (*Gopherus berlandieri*) – open scrub woods, arid brush, lomas, grass-cactus association; open brush with grass understory preferred; uses shallow depressions at base of bush or cactus or underground burrow or hides under surface cover		T

*** VASCULAR PLANTS ***

	Federal Status	State Status
Ashy dogweed (*Thymophylla tephroleuca*) - endemic; grassland or blackbrush or cenizo shrublands on fine sandy loam soils; flowering February-November	LE	E
Chihuahua balloon-vine (*Cardiospermum dissectum*) - shrublands on gravelly soils along Lower Rio Grande Valley; flowering July-September		
Few-spined Engelmann's prickly pear (*Opuntia engelmannii* var. *flexospina*) - endemic; dry gravelly hills near Rio Grande		
Gregg's wild-buckwheat (*Eriogonum greggii*) - grasslands and brushlands on gypsum-capped hills; flowering in summer?		
Johnston's frankenia (*Frankenia johnstonii*) - shrublands on flats on saline sandy to clayey soils and on rocky gypseous slopes; flowering throughout year depending on rainfall	LE	E
Kleberg saltbush (*Atriplex klebergorum*) - endemic; sandy to clayey loams, usually saline; often with other halophytes; maturation usually occurs in fall but may vary with rainfall		
Prostrate milkweed (*Asclepias prostrata*) - open bare ground on loose sandy loam, including disturbed areas; flowering March-October		
Runyon's cory cactus (*Coryphantha macromeris* var. *runyonii*) - endemic; low hills and flats on gravelly soils in Tamaulipan shrub communities along the Rio Grande		
Small papillosus cactus (*Echinocereus papillosus* var. *angusticeps*) - endemic; sandy to		

	Federal Status	State Status
gravelly soils in grasslands or mesquite-acacia shrublands		
St. Joseph's staff (*Manfreda longiflora*) – endemic; various soils (clays and loams with various concentrations of salt, caliche, sand, and gravel) in openings or amongst shrubs in thorny shrublands; on Catahoula and Frio formations, and also on Rio Grande floodplain alluvial deposits; flowering in September		
Star cactus (*Astrophytum asterias*) – gravelly saline clays or loams over the Catahoula and Frio formations, on gentle slopes and flats in grasslands or shrublands; flowering in May	LE	E
Vasey's adelia (*Adelia vaseyi*) – subtropical woodlands in Lower Rio Grande Valley; flowering January-June		
Walker's manioc (*Manihot walkerae*) – periphery of native brush in sandy loam; also on caliche cuestas?; flowering April-September (following rains?)	LE	E
Zapata bladderpod (*Lesquerella thamnophila*) - endemic; blackbrush and/or cenizo shrublands on gravelly to sandy loams derived from Eocene formations; flowering March-April	LE	E

LE,LT - Federally Listed Endangered/Threatened
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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
TERRELL COUNTY

Revised:
98-04-24

Scientific Name	Common Name	Federal Status	State Status
*** BIRDS			
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
ICTERUS CUCULLATUS CUCULLATUS	MEXICAN HOODED ORIOLE		
VIREO ATRICAPILLUS	BLACK-CAPPED VIREO	LE	E
*** FISHES			
CYCLEPTUS ELONGATUS	BLUE SUCKER		T
CYPRINELLA PROSERPINA	PROSERPINE SHINER		T
CYPRINODON PECOSENSIS	PECOS PUPFISH	~~PE~~ DL	T
ETHEOSTOMA GRAHAMI	RIO GRANDE DARTER		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER		
*** MAMMALS			
CYNOMYS LUDOVICIANUS ~~ARIZONENSIS~~	~~ARIZONA~~ BLACK-TAILED PRAIRIE DOG	C	
MYOTIS VELIFER	CAVE MYOTIS BAT		
SYLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL		
URSUS AMERICANUS	BLACK BEAR	~~T/SA~~	T
*** REPTILES			
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
TRACHEMYS GAIGEAE	BIG BEND SLIDER		
*** VASCULAR PLANTS			
ACLEISANTHES WRIGHTII	WRIGHT'S TRUMPETS		
CEREUS GREGGII VAR GREGGII	DESERT NIGHT-BLOOMING CEREUS		
CHAMAESYCE JEJUNA	DWARF BROOMSPURGE		
CORYPHANTHA HESTERI	HESTER'S CORY CACTUS		
CORYPHANTHA RAMILLOSA	BUNCHED CORY CACTUS	LT	T
HEXALECTRIS WARNOCKII	WARNOCK'S CORAL-ROOT		
PERITYLE CINEREA	GRAYLEAF ROCK-DAISY		
PHYLLANTHUS ERICOIDES	HEATHER LEAF-FLOWER		
POLYGALA MARAVILLASENSIS	MARAVILLAS MILKWORT		
RORIPPA RAMOSA	DURANGO YELLOW-CRESS		
SENNA ORCUTTII	ORCUTT'S SENNA		

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
VAL VERDE COUNTY

Revised:
98-03-27

Scientific Name	Common Name	Federal Status	State Status
*** AMPHIBIANS			
EURYCEA SP 7	EDWARDS PLATEAU SPRING SALAMANDERS		
*** BIRDS			
BUTEO ALBONOTATUS	ZONE-TAILED HAWK		T
CHARADRIUS ALEXANDRINUS	SNOWY PLOVER		
FALCO PEREGRINUS	PEREGRINE FALCON	~~E/SA~~ DL	E, T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
ICTERUS CUCULLATUS CUCULLATUS	MEXICAN HOODED ORIOLE		
ICTERUS GRADUACAUDA AUDUBONII	AUDUBON'S ORIOLE		
MYCTERIA AMERICANA	WOOD STORK		T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	LE	E
VIREO ATRICAPILLUS	BLACK-CAPPED VIREO	LE	E
*** FISHES			
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER		T
CYCLEPTUS ELONGATUS	BLUE SUCKER		T
CYPRINELLA PROSERPINA	PROSERPINE SHINER		T
CYPRINODON EXIMIUS	CONCHOS PUPFISH		T
CYPRINODON PECOSENSIS	PECOS PUPFISH	~~PE~~ DL	T
DIONDA DIABOLI	DEVILS RIVER MINNOW	~~PE~~ LT	T
ETHEOSTOMA GRAHAMI	RIO GRANDE DARTER		T
GAMBUSIA SENILIS (extirpated)	BLOTCHED GAMBUSIA		T
GAMBUSIA SPECIOSA	SOUTHWESTERN GAMBUSIA		
ICTALURUS LUPUS	HEADWATER CATFISH		
NOTROPIS JEMEZANUS	RIO GRANDE SHINER		
NOTROPIS SIMUS (extirpated)	BLUNTNOSE SHINER		T
*** INSECTS			
CHEUMATOPSYCHE FLINTI	FLINT'S NET-SPINNING CADDISFLY		
*** MAMMALS			
EUMOPS PERCTIS CALIFORNICUS	GREATER WESTERN MASTIFF BAT		
GEOMYS PERSONATUS FUSCUS	TEXAS POCKET GOPHER		
MYOTIS VELIFER	CAVE MYOTIS BAT		
MYOTIS YUMANENSIS	YUMA MYOTIS BAT		
URSUS AMERICANUS	BLACK BEAR	~~T/SA~~	T
*** MOLLUSKS			
DISCONAIAS SALINASENSIS	SALINA MUCKET		
POPENAIAS POPEI	TEXAS HORNSHELL	C	

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*** REPTILES			
CROTAPHYTUS RETICULATUS	RETICULATE COLLARED LIZARD		T
DRYMARCHON CORAIS	INDIGO SNAKE		T
GOPHERUS BERLANDIERI	TEXAS TORTOISE		T
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD		
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
TANTILLA ATRICEPS	MEXICAN BLACKHEAD SNAKE		
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE		T
TRACHEMYS GAIGEAE	BIG BEND SLIDER		
*** VASCULAR PLANTS			
ACLEISANTHES CRASSIFOLIA	TEXAS TRUMPETS		
ACLEISANTHES WRIGHTII	WRIGHT'S TRUMPETS		
ANCISTROCACTUS TOBUSCHII	TOBUSCH FISHHOOK CACTUS	LE	E
CHAMAESYCE JEJUNA	DWARF BROOMSPURGE		
DALEA SABINALIS	SABINAL PRAIRIE-CLOVER		
ERIGERON MIMEGLETES	SONORA FLEABANE		
FORSELLESIA TEXENSIS	TEXAS GREASE BUSH		
GALIUM CORRELLII	CLIFF BEDSTRAW		
JUSTICIA WRIGHTII	WRIGHT'S WATER-WILLOW		
KALLSTROEMIA PERENNANS	PERENNIAL CALTROP		
PEDIOMELUM HUMILE	RYDBERG'S SCURFPEA		
PERITYLE WARNOCKII	WARNOCK'S ROCK-DAISY		
PHYSOSTEGIA CORRELLII	CORRELL'S FALSE DRAGON-HEAD		
STYRAX TEXANUS	TEXAS SNOWBELLS	LE	E

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TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
WEBB COUNTY

Revised:
98-03-31

Scientific Name	Common Name	Federal Status	State Status
*** BIRDS			
BUTEO ALBICAUDATUS	WHITE-TAILED HAWK		T
BUTEO NITIDUS	GRAY HAWK		T
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK		T
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	~~LE~~ DL	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	~~E/SA~~ DL	T
ICTERUS CUCULLATUS SENNETTI	SENNETT'S HOODED ORIOLE		
ICTERUS GRADUACAUDA AUDUBONII	AUDUBON'S ORIOLE		
MYCTERIA AMERICANA	WOOD STORK		T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	LE	E
*** FISHES			
CYCLEPTUS ELONGATUS	BLUE SUCKER		T
CYPRINODON EXIMIUS	CONCHOS PUPFISH		T
ETHEOSTOMA GRAHAMI	RIO GRANDE DARTER		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER		
NOTROPIS SIMUS (EXTIRPATED)	BLUNTNOSE SHINER		T
*** MAMMALS			
FELIS PARDALIS	OCELOT	LE	E
FELIS YAGUARONDI	JAGUARUNDI	LE	E
GEOMYS PERSONATUS DAVISI	DAVIS POCKET GOPHER		
MYOTIS VELIFER	CAVE MYOTIS BAT		
NASUA NARICA	WHITE-NOSED COATI		T
*** MOLLUSKS			
POPENAIAS POPEI	TEXAS HORNSHELL	C	
*** REPTILES			
CROTAPHYTUS RETICULATUS	RETICULATE COLLARED LIZARD		T
DRYMARCHON CORAIS	INDIGO SNAKE		T
GOPHERUS BERLANDIERI	TEXAS TORTOISE		T
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD		
HOLBROOKIA PROPINQUA	KEELED EARLESS LIZARD		
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
*** VASCULAR PLANTS			
ATRIPLEX KLEBERGORUM	KLEBERG SALTBUSH		
CORYPHANTHA SULCATA VAR NICKELSIAE	NICKEL'S CORY CACTUS		
FRANKENIA JOHNSTONII	JOHNSTON'S FRANKENIA	LE	E
OPUNTIA ENGELMANNII VAR FLEXOSPINA	FEW-SPINE ENGELMANN'S PRICKLY-PEAR		
PARONYCHIA MACCARTII	MCCART'S WHITLOW-WORT		
THYMOPHYLLA TEPHROLEUCA	ASHY DOGWEED	LE	E

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Revised: 98-03-31

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ZAPATA COUNTY

*** AMPHIBIANS ***

Species	Federal Status	State Status
Black Spotted Newt (*Notophthalmus meridionalis*) - can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods; Gulf Coastal Plain south of the San Antonio River		T
Mexican Burrowing Toad (*Rhynophrynus dorsalis*) - roadside ditches, temporary ponds, arroyos, or wherever loose friable soils are present in which to burrow; generally underground emerging only to breed or during rainy periods		T
Mexican Treefrog (*Smilisca baudinii*) - subtropical region of extreme southern Texas; breeds May-October coinciding with rainfall, eggs laid in temporary rain pools		T
Sheep Frog (*Hypopachus variolosus*) - predominantly grassland and savanna; moist sites in arid areas		T
South Texas Siren - large form (*Siren* sp. 1) - wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain; southern Texas south of Balcones Escarpment; breeds February-June		T
White-lipped Frog (*Leptodactylus labialis*) - grasslands, cultivated fields, roadside ditches, and a wide variety of other habitats; often hides under rocks or in burrows under clumps of grass; species requirements incompatible with widespread habitat alteration and pesticide use in south Texas		T

*** BIRDS ***

Species	Federal Status	State Status
American Peregrine Falcon (*Falco peregrinus anatum*) - potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (*Falco peregrinus tundrius*) - potential migrant	DL	T
Audubon's Oriole (*Icterus graduacauda audubonii*) – scrub, mesquite; nests in dense trees, or thickets, usually along water courses		
Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) - riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June		T
Common Black Hawk (*Buteogallus anthracinus*) – cottonwood-lined rivers and streams; willow tree groves on the lower Rio Grande floodplain; formerly bred in south Texas		T
Gray Hawk (*Buteo nitidus*) - mature woodlands of river valleys and nearby semiarid mesquite and scrub grasslands		T
Hook-billed Kite (*Chondrohierax uncinatus*) - dense tropical and subtropical forests, but does occur in open woodlands; uncommon to rare in most of range; accidental in south Texas		
Interior Least Tern (*Sterna antillarum athalassos*) – nests along sand and gravel bars within braided streams, rivers & some inland lakes	LE	E
Northern Beardless-tyrannulet (*Camptostoma imberbe*) - mesquite woodlands; near Rio Grande frequents cottonwood, willow, elm, and great leadtree; breeding April to July		T
Rose-throated Becard (*Pachyramphus aglaiae*) – riparian trees, woodlands, open forest, scrub, and mangroves; breeding April to July		T
Sennett's Hooded Oriole (*Icterus cucullatus sennetti*) - often builds nests in and of Spanish moss (*Tillandsia unioides*); feeds on invertebrates, fruit, and nectar; breeding March to August		
Tropical Parula (*Parula pitiayuma*) - dense or open woods, undergrowth, brush, and trees along edges of rivers and resacas; breeding April to July		T

	Federal Status	State Status
White-tailed Hawk (*Buteo albicaudatus*) - near coast it is found on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March to May		T
Wood Stork (*Mycteria americana*) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T

*** MAMMALS ***

	Federal Status	State Status
Davis Pocket Gopher (*Geomys personatus davisi*) - burrows in sandy soils in southern Texas		
Jaguarundi (*Felis yaguarondi*) – thick brushlands, near water favored; six month gestation, young born twice per year in March and August	LE	E
Ocelot (*Felis pardalis*) - dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas; breeds and raises young June-November	LE	E
White-nosed Coati (*Nasua narica*) - woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground & in trees; omnivorous; may be susceptible to hunting, trapping, & pet trade		T

*** MOLLUSKS ***

	Federal Status	State Status
Texas Hornshell (*Popenaias popeii*) - Rio Grande drainage from the Pecos River to the Falcon Breaks	C1	

*** REPTILES ***

	Federal Status	State Status
Indigo Snake (*Drymarchon corais*) - thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; can do well in suburban and irrigated croplands if not molested or indirectly poisoned; requires moist microhabitats, such as rodent burrows, for shelter		T
Keeled Earless Lizard (*Holbrookia propinqua*) - coastal dunes, barrier islands, and other sandy areas; eats insects and likely other small invertebrates; lays clutches of 2-7 eggs March-September (most May-August) in soil/underground		
Reticulate Collared Lizard (*Crotaphytus reticulatus*) - requires open brush-grasslands; thorn-scrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils; often on scattered flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly pear and mesquite		T
Texas Horned Lizard (*Phrynosoma cornutum*) - open arid or semi-arid regions with sparse vegetation; grass, cactus, scattered brush or scrubby trees; burrows into soil, uses rodent burrows, or hides under surface cover		T
Texas Tortoise (*Gopherus berlandieri*) - open scrub woods, arid brush, lomas, grass-cactus association; open brush with grass understory preferred; uses shallow depressions at base of bush or cactus or underground burrow or hides under surface cover		T

*** VASCULAR PLANTS ***

	Federal Status	State Status
Ashy dogweed (*Thymophylla tephroleuca*) - endemic; grassland or blackbrush or cenizo shrublands on fine sandy loam soils; flowering February-November	LE	E
Chihuahua balloon-vine (*Cardiospermum dissectum*) - shrublands on gravelly soils along Lower Rio Grande Valley; flowering July-September		
Correll's bluet (*Hedyotis correllii*) - sandy soils in openings in mesquite woodlands or thorn shrublands		
Correll's false dragon-head (*Physostegia correllii*) - wet soils including roadside ditches and irrigation channels; flowering June-July		
Few-spined Engelmann's prickly pear (*Opuntia engelmannii* var. *flexospina*) - endemic; dry gravelly hills near Rio Grande		
Johnston's frankenia (*Frankenia johnstonii*) - shrublands on flats on saline sandy to clayey soils and on rocky gypseous slopes; flowering throughout year depending on rainfall	LE	E
Prostrate milkweed (*Asclepias prostrata*) - open bare ground on loose sandy loam, including disturbed areas; flowering March-October		
Zapata bladderpod (*Lesquerella thamnophila*) - endemic; blackbrush and/or cenizo shrublands on gravelly to sandy loams derived from Eocene formations; flowering March-April	LE	E

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